GOVERNMENT OF INDAI
MINISTRY OF COMMENCE AND INDUSTY PTC. 244(N)
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REPORT

OF THE

TARIFF COMMISSION

ON THE

TITANIUM DIOXIDE INDUSTRY

PRINTED IN INDIA FOR THE MANAGER, GOVERNMENT OF INDIA PUBLICATIONS BRANCH, DELHI BY THE MANAGER GOVT. OF INDIA PHOTO-LITHO PRESS, NEW DELHI

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GOVERNMENT OF INDIA
MINISTRY OF COMMERCE AND INDUSTRY

New Delhi, the 9th December, 1953.

RESOLUTION
(Tariffs)

No.8(10)-T.B./52.- The Tariff Commission has submitted its Report on the Titanium Dioxide Industry on the basis of an enquiry under Section 11 read with Section 14 of the Tariff Commission Act, 1951. The Commission considers that the chief obstacle in the way of the speedy development of the industry is the comparative smallness of the internal demand. It is, therefore, extremely important to take steps to enlarge the volume of demand and for this purpose the Commission has recommended that:-

(1) the Travancore Titanium Products Limited should maintain their selling price of titanium pigments at or below Rs. 140/- per cwt. for anatase and Rs. 154/- per cwt. for rutile. In order to enable the Company to reduce the price to the above level a subsidy of Rs. 300/- per ton on sales of titanium dioxide of both types should be paid to the Company subject to a maximum of Rs. 2,70,000 per annum and this scheme should remain in force until the 31st December, 1954. A review of the case should be undertaken by the Commission before the end of 1954;

(2) a surcharge of Rs. 2/- per ton on export of ilmenite should be levied and the subsidy referred to at (1) above should be paid from the amount so realised;

(3) refund of customs duty on titanium tetrachloride used by the Company as raw material in the manufacture of rutile type of titanium pigments should be made.

2. Government agree with the Commission about the need to increase the consumption of titanium dioxide in the country. The recommendations of the Commission regarding the grant of a subsidy to the Indian Company do not, however,

need to be implemented at present because the Company has since received a large export order which is expected to enable it to maintain economic production even without a subsidy. Further, as the industry proposes to confine its production to the anatase type of titanium pigment, no relief regarding the import duty on titanium tetrachloride would be needed by it.

3. Regarding the grant of protection Government accept the Commission's recommendations that the industry should be given protection up to the 31st December, 1954 in the first instance and that a protective duty at the existing preferential rate of 25.2% *ad valorem* should be imposed on titanium dioxide. The standard rate will be fixed in accordance with the terms of the Indo-U.K. Trade Agreement, 1939.

4. Other recommendations made by the Commission are:-

(a) The Travancore-Cochin State Government should supply ilmenite to the Company after recovering from them only the "basic charge" for processing the sands.

(b) The Travancore-Cochin State Government should take steps to reduce the cost at which sulphuric acid is being supplied to the Company by the Fertilizers and Chemicals (Travancore) Limited, Alwaye.

(c) The cost of production of sulphuric acid in India should be examined and if necessary, suitable action should be taken under the Industries (Development and Regulation) Act to maintain the prices of this essential material at a reasonable level.

(d) Statistics relating to imports of titanium dioxide should be maintained separately by Collectors of Customs and the Director General of Commercial Intelligence.

(e) The National Chemical Laboratory, Poona, should continue its research work relating to the production of titanium dioxide by the hydrolysis of titanium tetrachloride under controlled conditions, determine the operating details and establish the economic advantages of the process with a view to the utilisation of a large quantity of chlorine and the conservation of sulphuric acid.

(f) Adequate supplies of blanc-fixe or similar extenders should be ensured to all users of titanium dioxide who are in need of such extenders.

(g) Imports of the special type of titanium pigment required by manufacturers of vitreous enamelware should be permitted to the extent of their actual requirements.

(h) The Indian Standards Institution should be requested to complete the work of providing paint formulations requiring the inclusion of titanium pigments.

(i) The practice of purchasing paints by weight and not by volume should be changed by the joint efforts of the concerned trade associations. Government should bring together the various interests concerned with a view to securing the general acceptance of the practice of sale of paints by volume.

(j) The Travancore Titanium Products Limited should maintain its own selling organisation at the major consuming centres in the country and provide facilities for technical advice by appointing qualified men at such centres.

(k) Every endeavour should be made by the Company to effect economies in operating costs under all possible heads.

5. Government will take suitable steps to help in the implementation of these recommendations as far as possible. They take this opportunity of drawing the attention of the industry to recommendations (j) & (k) in the preceding paragraph regarding the steps to be taken by them to reduce costs and popularise the use of titanium dioxide in the country.

L. K. JHA,
Joint Secretary to the Government of India.


सत्यमेव जयते

LIST OF THE REPORTS OF THE INDIAN TARIFF BOARD PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI

I. TARIFF INQUIRIES

(A) *New Cases*

1.	Sodium Thiosulphate, sodium sulphite (anhydrous) and sodium bisulphite (1946)	PTB	158
2.	Bichromates (1946)	PTB	157
3.	Phosphates and phosphoric acid (1946)	PTB	156
4.	Butter colour and aerated water powder colour (1946)	PTB	154
5.	Calcium chloride (1946)	PTB	153
6.	Coated abrasives (other than grinding wheels) (1946)	PTB	159
7.	Hurricane Lanterns (1946)	PTB	152
8.	Cocoa powder and chocolate (1946)	PTB	155
9.	Wood screws (1946)	PTB	99
10.	Bicycles (1946)	PTB	100
11.	Caustic soda and bleaching powder (1946)	PTB	88
12.	Antimony (1946)	PTB	94
13.	Sewing machines (1947)	PTB	101
14.	Aluminium (1946)	PTB	90
15.	Steel baling hoops (1946)	PTB	87
16.	Grinding Wheels (1946)	PTB	93
17.	Preserved fruits (1946)	PTB	145
18.	Non-ferrous metals (1946)	PTB	146
19.	Cotton textile machinery (ring frames, spindles and spinning rings) (1947)	PTB	111
20.	Rubber manufactures (1947)	PTB	110
21.	Sodium and potassium metabisulphites (1947)	PTB	105
22.	Alloy tool and special steel (1947)	PTB	118
23.	Sodium sulphide (1947)	PTB	102
24.	Electric Motors (1947)	PTB	112
25.	Dry battery (1947)	PTB	115
26.	Plywood and teachests (1947)	PTB	113
27.	Cotton and hair belting (1947)	PTB	121
28.	Starch (1947)	PTB	103
29.	Glucose (1947)	PTB	104
30.	Chloroform, ether sulphuric p.b. and anaesthetic and potassium permanganate (1947)	PTB	109
31.	Fire hose (1947)	PTB	120
32.	Steel belt lacing (1947)	PTB	119
33.	Ferro-silicon (1947)	PTB	116
34.	Stearic acid and oleic acid (1947)	PTB	117
35.	Machine tools (1947)	PTB	114
36.	Wire healds (1948)	PTB	123
37.	Pickers (1948)	PTB	125
38.	Motor vehicle batteries (1948)	PTB	122
39.	Hydraulic brake fluid (1948)	PTB	129
40.	Bobbins (1948)	PTB	128

II. PRICE REPORTS

TARIFF COMMISSION'S REPORTS

1.	Mysore Iron and steel prices (1952)	PTB 217
2.	Motor vehicle battery (1952)	PTC 218
3.	Woollen hosiery (1952)	PTC 219
4.	The f.r.p. of steel produced by the SCOB (1952)	PTC 222
5.	Review of retention prices of tinplate (1952)	PTC 221
6.	Fair ratio between the ordinary shares of SCOB and IISCO (1952)	PTC 225
7.	Ball bearings and steel balls (1952)	PTC 220
8.	Automobile industry (1953)	PTC 232
9.	Fair prices of superphosphates 1st January to 15th August, 1952	PTC 228
10.	Revision of prices of raw rubber (1952)	PTC 223
11.	Reduction of import duty on meta-aminophenol used in the manufacture of para-aminosalicylic acid (1952)	PTC 229
12.	Flax goods industry (1953)	PTC 230
13.	Power and distribution transformers (1952)	PTC 224
14.	Conversion charges for bars and rods and the fair retention price of electric furnace billets produced by the registered re-rollers (1952)	PTC 226
15.	Automobile manufacture in India (1953)	PTC 242
16.	Glucose (1953)	PTC 231

CONTENTS

APPENDICES (contd.) Page

REPORT ON THE TITANIUM DIOXIDE INDUSTRY

1. The Travancore Titanium Products Ltd., Trivandrum, the only manufacturers of titanium dioxide in India, applied for protection and/or assistance to the titanium dioxide industry in their letter No. AB/SRS/8006 dated 7th August, 1952, addressed to the Ministry of Commerce & Industry, Government of India. The Government of India, in the Ministry of Commerce & Industry by their Resolution No. 1-T(21)/52 dated 15th November, 1952, referred this application to the Tariff Commission for inquiry and report under Section 11 read with Section 14 of the Tariff Commission Act, 1951 (*Vide* Appendix I).

Origin of the case.

2. The present case falls under Section 11(a) of the Tariff Commission Act (the grant of protection for the encouragement of any industry) and is governed by Section 14 of that Act [principles to be taken into account in making any inquiry under Section 11(a)]. Under the latter Section, the Commission is to have, among other matters, due regard to:-

Terms of reference.

(a) the cost of production or manufacture in the principal growing, producing or manufacturing regions of India of the commodity produced by the industry claiming protection and the cost which should be taken to be representative of the industry concerned;

(b) the approximate cost of production or manufacture in the principal growing, producing or manufacturing centres of foreign countries of the commodity which competes with the commodity produced by the industry claiming protection, if the determination of such cost is necessary for the purpose of any case;

(c) the approximate cost of import of any such competing commodity as is specified in clause (b);

(d) the price which may be deemed to be the representative fair selling price for growers, producers or manufacturers in India in respect of the industry claiming protection;

(e) the quantities of the commodity required for consumption and the quantities thereof produced in or imported into India;

(f) the effect of protection, if granted to an industry, on other industries, including cottage and other small-scale industries.

On the basis of its findings on the points referred to above, the Commission is to assess for the purpose of its Report:-

(a) the relative advantages enjoyed by the industry;

(b) the nature and extent of foreign competition;

(c) the possibility of the industry developing sufficiently within a reasonable time to be able to carry on successfully without protection;

(d) the likely effect of a protective tariff or other form of protection on the interests of the consumer or of the industries using the commodity in question, as the case may be; and

(e) the desirability or otherwise of protecting the industry in the public interest.

Section 14 further provides that in recommending the grant of protection to any industry, the Commission may specify the conditions which shall be fulfilled before and after the grant of protection with particular reference to the following points, namely:-

(a) the scale of output;

(b) the quality of its products;

(c) the price charged for its products;

(d) the technological improvements required by the industry;

(e) the need for research in the process of manufacture;

(f) the training of officers, technicians and other persons employed in the industry;

(g) the use in the industry of indigenous products, whether raw or manufactured;

(h) the time within which an industry in respect of which protection has been given in advance of production, should start production; and

(i) any other matter in respect of which the Commission considers it necessary to specify conditions.

Method of inquiry.

3. (a) On the 5th March, 1953, a press note was issu inviting persons and associations interested in this indust to obtain copies of the questionnaires prepare by the Commission for producers, importers and consumers and to submit replies thereto. Simultaneously, questionnaires were issued to the Travancore Titanium Products Ltd., and to all the known consumers and importers. Producers of competitive white pigments like lithopone, zinc oxide and white lead were addressed for information with regard to their rated capacity and actual production. A list of firms and bodies to whom the Commission's questionnaires were issued and from whom replies or memoranda were received is given in Appendix II.

(b) The Collectors of Customs, Bombay, Madras, Calcutta and Cochin were requested to furnish information regarding the c.i.f. prices and the quantity and value of imports of (i) titanium dioxide (anatase and rutile), (ii) lithopone, (iii) zinc oxide and (iv) white lead. The Directors of the Indian Bureau of Mines and the Geological Survey of India were requested to furnish detailed memoranda regarding ilmenite ore which is an essential raw material for the manufacture of titanium dioxide. As ilmenite ore is exported to foreign countries, the Indian Commercial Representatives in U.K., U.S.A., Germany, Australia and Japan were asked to furnish the Commission with an appreciation of the competitive advantages of Travancore ilmenite in the respective markets with reference to price and quality. The Directors, National Chemical Laboratory, Poona; Technical Development Establishment Laboratories, Kanpur; the Technical Development Establishment, Military Explosives, Poona; the Government Test House, Alipore and the Department of Chemical Technology, University of Bombay, were also consulted on the extent to which titanium dioxide can replace other pigments like lithopone, zinc oxide and white lead. Letters

were also addressed to the Indian Standards Institution, the Central Standards Office, Ministry of Railways and the Defence Services Laboratory, Naval Head Quarters, New Delhi.

(c) Dr. B.V. Narayanaswamy Naidu, Member, accompanied by Shri S.S. Mehta, Technical Adviser to the Commission, visited the factory of the Travancore Titanium Products Ltd., on 2nd and 3rd March, 1953. A public inquiry was held at the Commission's office in Bombay on the 12th June, 1953 and on the following day the Commission held discussions with the representatives of the Travancore Titanium Products Ltd., and the Travancore-Cochin Government on the details of cost. A list of persons who attended the public inquiry is given in Appendix III.

Scope of the inquiry.

4. (a) The scope of the inquiry includes all varieties of titanium dioxide. Apart from the two general grades of titanium dioxide, namely, anatase and rutile, there would appear to be a number of other grades specially processed for use by particular industries. They differ principally, in their physical properties and in admixture with extenders like blanc fixe or calcium sulphate. Indian consumers have been offered, so far, only one grade of all-purpose *anatase* titanium dioxide by the Travancore Titanium Products Ltd., who have now equipped themselves for manufacturing the all-purpose rutile type also. The Company state that the all-purpose grades of anatase and rutile type pigments which they are now in a position to manufacture can practically meet all the requirements of the Indian industry. Some of the consuming interests, however, have asked for special treatment, and these cases are considered below.

(b) From representations made to us by individual manufacturers of enamelware, and the Vitreous Enamellers' Association, Calcutta, we understand that the enamelware industry uses a special type of titanium dioxide with the trade name of Titanox TG-400 manufactured by Titanium Pigments Corporation, New York, for obtaining acid resisting

and heat resisting qualities in enamelware and for imparting white opacity thereto. This industry does not approve of the indigenous pigment as it does not produce the brilliant white colour which is favoured by consumers and has represented that as the enamelware produced in the country has an expanding market and has great possibilities of export (provided quality and finish are maintained at present standards), the special type of pigment which the industry is now importing should be excluded from the scope of our inquiry. The representative of the Travancore Titanium Products, stated in answer to the above contention, that the anatase pigment manufactured by them could be used by enamelware manufacturers by effecting certain changes in their processes of manufacturing enamelware. We do not think, however, that this affords a convincing solution of the problem since it involves, apart from slightly increased cost, a process of gradual education of the users, with attendant risks to the development of the enamelware industry, in the meantime. We, therefore, recommend that imports of the special type of titanium pigment required by manufacturers of Vitreous Enamelware should be permitted to the extent of their actual requirements, though such type need not be excluded from the scope of this enquiry.

(c) Titanium dioxide (anatase) of a very high degree of purity and fineness in particle size is required by the Rayon industry as delustering agent in the production of dull rayon. Rayon manufacturers have expressed doubts about the suitability of the indigenous pigment for their requirements, but the question is not of current interest since dull rayon is not being produced in the country to any appreciable extent. In the circumstances, no special consideration need be given to the requirements of the rayon industry at present.

5. The first use of titanium compound as a pigment was made around 1870 when rutile was mixed with a bituminous venicle for use as a resistant paint on the bottoms of ships. In 1893 the first patent covering a paint containing rutile was granted. In 1908 the Norwegian Government, who had large ilmenite sand deposits, financed research for extracting titanium dioxide from ilmenite and finding uses for the pigment. As a result the process of extracting titanium dioxide by digestion of ilmenite with sulphuric acid was discovered. At about the same time, legislation in Europe against the use of white lead as a hiding pigment gave further impetus to the research in the production of titanium dioxide. Finally in 1915, the process of obtaining from ilmenite white titanium pigment which was substantially free from iron was patented. Commercial production of titanium dioxide, however, began only about the year 1920, since when remarkable and rapid developments have taken place in the industry. In 1931 the production in U.S.A. amounted to about 10,000 tons. At present, production in U.S.A. is of the order of 300,000 tons while in the U.K. it is reported to be about 45,000 tons with plans for stepping it up to 75,000 tons. There are now six factories in the U.S.A., four in Japan (with one more in the offing sponsored by the Glidden Paint Co. in association with Japanese interests) and two each in England, Germany, France, Italy, Czechoslovakia, Norway and the U.S.S.R. and one in Australia. Although India was the most important supplier of the essential raw material for the industry for several years, she remained merely an exporter of ilmenite till the Travancore project was given effect to.

Manufacture of titanium pigment - Synoptic History.

6. Titanium dioxide has now come to be regarded as the major white pigment of commerce and its extremely rapid development has been due to its capacity to combine in itself certain very desirable properties. It is the strongest white pigment known, with the highest refractive index and the highest hiding power;

Uses of titanium dioxide.

it has high tinting strength, is inert to venicle and completely non-toxic. In addition to being used in a large number of industries as a pigment and filler, it has been accepted for a variety of industrial applications, for instance, as an opacifying agent in the plastics industry, as a catalyst in the preparation of a good many types of organic compounds and cracking of petroleum, as a delustering agent in the rayon industry and as a constituent in the manufacture of welding rods and electric insulators. The following statement indicates the pigments which are used for different purposes in each consuming industry:

Industry	Variety of titanium dioxide	Use	Other white pigments used
1. Paint	Anatase and rutile.	As a pigment alone or with other pigments and extenders in the production of paints, lacquers, enamels, baked finishes, etc.	Lithopone, zinc oxide, white lead and antimony oxide.
2. Printing ink.	Anatase or rutile.	As a pigment for the production of white inks and opaque coloured inks.	Lithopone and zinc oxide.
3. Rubber	Anatase or rutile.	As whitening agent and filler for the manufacture of tyres and miscellaneous rubber goods.	Lithopone.
4. Vitreous enamelware.	Anatase or rutile.	For the production of heat-resistant and acid-proof white enamelware.	Tin oxide and zinc oxide.
5. Soap and cosmetics.	Anatase	As an opacifier, whitening agent and filler.	Zinc oxide.
6. Textiles	Anatase	As a delustering agent in the rayon industry and finishing material in other textiles.	Lithopone and zinc oxide for textiles other than rayon.
7. Linoleum and leather cloth.	Anatase or rutile.	As a pigment in drying oil or synthetic plastic media.	Lithopone.
8. Paper	Anatase	As a whitening agent and filler for production of special types of paper including cigarette paper.	None.

In the paint industry titanium dioxide pigment is used for the production of white or coloured paints, sometimes by themselves, but more often in conjunction with other pigments and extenders. A variety of paints for interior as well as exterior applications are produced by incorporation of titanium dioxide with other white pigments and extenders in boiled linseed oil medium. Moreover, a large range of high grade paints such as marine paint, weather-resistant paint, acid and chemical resistant paint as well as primers, enamels, lacquers and baked finishes are produced by using titanium dioxide in conjunction with oil modified alkyd resins or synthetic plastic media. In the rubber industry it is used as a whitening agent for the manufacture of rubber tyres as well as miscellaneous rubber goods. Lithopone is also used to some extent for the same purpose but the quality of the product is definitely superior when titanium dioxide is utilised. A large quantity of zinc oxide is used in this industry as an activatpr in the formulation of rubber compound and the specific properties of zinc oxide make it indispensable for this purpose. In the vitreous enamelware industry titanium dioxide is preferred in view of the superior quality of the enamelware resulting from its use. Zinc oxide and tin oxide are used as alternative materials but the enamelware produced is slightly inferior and the use of tin oxide is not found to be economic because of its high price.

The Travancore Titanium Products Ltd.: Growth, progress and present position.

7.(a) In 1945, when the mining agreements between the Travancore State Government on the one hand, and each of the four mineral companies, *viz.*, Hopkin & Williams (Travancore) Ltd., the Travancore Minerals Co. Ltd., F.X. Pereira & Sons (Travancore) Ltd., and the Associated Minerals Co. Ltd., fell due for renewal, the State Government decided that these companies should be asked to interest themselves in the establishment of an Indian unit for the manufacture of titanium pigment as *quid pro quo* for the continuance of the mining concessions. The chief

customers of Hopkin & Willaims (Travancore) Ltd., were the National Lead Company (U.S.A.). The chief customers of the Travancore Minerals Co. Ltd., were E.I. Du Pont de Nemours & Co., Inc., (also of U.S.A.) and there was a strong financial link between these two companies. All the four mineral companies supplied ilmenite to the British Titan Products Co. Ltd., (U.K.) who were the main exporters of titanium dioxide to the Indian market. Protracted negotiations took place between the State Government on the one hand and the representatives of the mining companies and of the British Titan Products Co., on the other. During the negotiations it was agreed that the minimum economic unit for the manufacture of titanium dioxide was to be one with a capacity of 1800 tons per year though this capacity was considered too large for internal demand in India which was about 100 tons per annum in 1945. [Any apprehensions about surplus capacity, however, receded to the background during the construction period of the factory because of the phenomenal increase in the world demand with which increasing world productive capacity could not keep pace during the same period. It was expected that there would be similar increase in Indian demand, or that, at any rate, surplus Indian production could be exported at an advantageous price. Indeed, the export prospects were favourable up to the end of 1951 when the seller's market in titanium pigment suddenly collapsed.] At an early stage of the negotiations it was proposed to arrange with E.I. Du Pont de Nemours & Co., Inc. that they should take agreed portions of the first five years' production of the Travancore factory at cost plus 10% in return for their being allowed to draw their ilmenite requirements from Travancore. This proposal, however, fell through before the negotiations were finalised. In the absence of such an arrangement with E. I. Du Pont de Nemours & Co., it was feared that the project might result in uneconomic working in its early stages. The British Titan Products Co., Ltd., who were also considering the

project, felt that it might be possible to make good the losses, if any, from a fund built out of a levy on exports of ilmenite from Travancore.

(b) When the negotiations were finalised in 1946 it was decided to promote a public limited company called Travancore Titanium Products Ltd., incorporated under the Travancore Companies Act with an authorised capital of Rs. 36 lakhs divided into 360,000 shares of Rs. 10 each allocated as under:-

The Travancore State Government	1,83,600	shares
British Titan Products Co. Ltd.	93,336*	"
Hopkins & Williams (Travancore) Ltd.	26,668	"
A. & F. Harvey Ltd., Madurai	26,668	"
F. X. Pereira & Sons (Travancore) Ltd.	13,064	"
Associated Minerals Co. Ltd.	13,064	"
Public	3,600	"
Total	3,60,000	shares

[(*) Of which 26,668 shares were to be issued for services rendered and agreed upon.]

The Travancore Minerals Co. Ltd., who were one of the promoters of the Company at the negotiations stage did not take up their allotment when the share capital was issued.

(c) The Indian Titan Products Co. Ltd., a newly formed subsidiary of the British Titan Products Co. Ltd., were appointed managing agents of the Company for a period of 20 years from 3rd March 1947 with remuneration at the rate of 10% on the net profits whether dividends were declared or not. The British Titan Products Co. Ltd., undertook to provide the technical personnel for the new plant and all technical information in their possession and at their free disposal regarding the manufacture, use and development of the titanium pigments. They further undertook to keep the managing agents informed of all developments and discoveries relative thereto, and initiate the industry successfully in the State. They also agreed to refrain from marketing the pigment of their (British)

manufacture (or such grades thereof as were not included in the Indian unit's programme) in India. A Board of nine directors was constituted of which one was to be a nomine of the State Government, and two, nominees of the managin agents.

(d) When the constructional stage of the project w reached, it was found that the original estimate of capit requirements was far below its needs, and the capit was therefore increased to Rs. 75 lakhs with the Stat Government, the British Titan Products Co. Ltd., and A. & F. Harvey Ltd., agreeing to take up additional 1,98,900. 72,224 and 60,000 shares respectively, the Madura Mills Co. Ltd., agreeing to take up 40,000 shares and additional 318 shares being issued to the public.

(e) The present authorised capital of the Travancore Titanium Products Co. Ltd., is Rs. 75 lakhs, and the current capital structure is as follows:-

	Rs.	
Travancore State Government	38,25,000 -	51 %
British Titan Products Co. Ltd.	16,55,600 -	22 %
Hopkin & Williams (Travancore) Ltd.	2,66,680 -	3.6 %
Associated Minerals Co. Ltd.	1,30,640 -	1.7 %
F. X. Pereira & Sons (Travancore) Ltd.	1,30,640 -	1.7 %
A. & F. Harvey Ltd., Madurai	8,66,680 -	11.6 %
Madura Mills Co. Ltd.	4,00,000 -	5.3 %
Public	35,430 -	0.47%
Total	73,10,670	

The percentage of the capital held by Indian nationals is stated to be about 71.77%.

(f) The original capital cost of the unit has been given as Rs. 67,10,538 made up as under:-

Factory buildings	Rs. 13,18,019
Non-factory buildings	Rs. 5,11,981
Plant and machinery	Rs. 44,62,578
Other fixed capital	Rs. 4,17,960
Total	Rs. 67,10,538

(g) When the project was first considered the intention was to establish the factory at Chavara, adjacent to the ilmenite deposits, in close proximity to the contemplated second contact unit for sulphuric acid manufacture (to be built for Fertilizers & Chemicals, Travancore Ltd.) at Kundara. When the test borings for water were carried out, however, it was found that there was no suitable spot in the Chavara District, and as very large quantities of water, of a high standard of purity are required for processing titanium dioxide, the present site at Trivandrum was chosen. This has resulted in expensive transport leads both for ilmenite and for sulphuric acid, the main raw materials. They are now being conveyed by back water canal transport to the company's wharf situated at a distance of three miles from the factory and taken to the site by road lorries. The sulphuric acid is carried in steel tanks (each holding about 3 tons of acid) from the FACT's acid plant at Alwaye, a distance of some 150 miles by canal from Trivandrum. (It may be mentioned that FACT's second sulphuric acid manufacturing unit was not built at Kundara as originally contemplated, but at Alwaye.) A wallom carries two of these tanks which are transferred by crane directly from wallom to lorries at the wharf. The acid is pumped from the tanks into large storage tanks at the site without removal from the lorries, which then immediately return the empty tank to the wallom for another trip. A wallom takes about 28 days to make the return canal journey and a fleet of about 40 walloms is constantly on water transporting acid.

(h) Erection of the buildings began in May 1949 and the administrative block of offices, the first building to be erected, was occupied in November 1949 by the commercial and engineering design sections. Commercial production was commenced on the 1st October 1951 and anatase titanium dioxide aggregating 386 tons was produced during the next few months. The products was first placed on themarket in December 1951 at a price of Rs. 195/- per cwt. Sales till the end of June 1952 amounted to only 103 tons, and as

stocks did not move fast enough, the price was reduced in two stages to Rs. 140/- per cwt. in order to stimulate the demand. The balance of 283 tons has been since sold out.

(i) The Imperial Chemical Industries (India) Ltd., who had been functioning as agents for the British Titan Products Co. Ltd., were appointed as selling agents to sell the pigment at an uniform all-India price, ex-godowns, in all main centres with a commission of 5% on the selling price. The sales agency agreement with the above company came to an end on the 31st May, 1953 and was not renewed.

(j) The conditions that prevailed upto the end of 1951, when titanium pigments were in short supply throughout the world and prices ruled very high, did not continue in 1952 with freer supply and greatly reduced prices. Because of high manufacturing costs relative to those of foreign producers the Company was unable to build up a sufficient volume of sales to maintain an economic production rate. In addition, they had to resort to borrowings from a bank, from their managing agents and selling agents, and as the financial position became very acute the factory was closed down and placed on care and maintenance basis from the end of June, 1952.

(k) On realising that rutile titanium dioxide was also required to meet internal demand, additional plant and equipment was installed and necessary modifications were effected after June, 1952 to enable the factory to produce the rutile type of pigment as well as the anatase type.

(l) To our specific question as to why production of the anatase type was undertaken and not the rutile type, the Company have stated that: (i) the high strength rutile type of pigment became available in the United Kingdom only in 1949, and it took considerable time for consumers there to realise that the greater price paid therefor was more than justified by its increased strength and other properties, (ii) an increasing preference for the rutile

type became evident only in 1951, (iii) the Australian plant sponsored by the British Titan Products Co. Ltd., had been designed for the manufacture of rutile pigment, and it was envisaged that the surplus production of the anatase type in India could be absorbed by Australia. The hope of utilising Australia as an export market did not materialise in 1952 owing to the collapse of the seller's market in the pigment and the low level of world prices thereof. We were, however, informed, during the course of the enquiry, that titanium dioxide is again the short supply and that Australia is now in a position to absorb the anatase type to the extent of about 750 tons.

(m) An analysis of the Company's balance sheet as at 31st December, 1952 is furnished below:-

Liabilities		*Assets*	
Capital paid up	73,10,670	Fixed capital expenditure.	60,60,992
Forfeited shares	1,021	Preliminary expenses.	51,688
Unsecured loans	8,03,694	Stores, spares and raw materials.	8,79,337
Due to managing agents.	66,105	Stocks in trade	3,94,636
For goods supplied	5,582	Advances & Book debts.	13,315
For expenses	41,186	Sundries	56,906
For other finance	6,944	Cash	22,903
For selling agents	2,50,213	Loss	10,05,638
	84,85,415		84,85,415

Under liabilities, unsecured loans aggregating to Rs. 8,03,694 have been obtained from:-

The Travancore Bank Ltd., (on a guarantee furnished by A. & F. Harvey Ltd.) (Interest @ 5% for Rs. 5 lakhs and at 6% for the balance.)	Rs. 6,99,231
A. & F. Harvey Ltd. - Int. @ 6%	Rs. 1,04,463
	Rs. 8,03,694

The Indian Titan Products Ltd., as managing agents, have advanced Rs. 66,105/- interest free.

The advance of Rs. 2,50,213/- from Imperial Chemical Industries (India) Ltd., with interest at 4% per annum is self liquidating (by sales proceeds of stocks) and is reported to have been paid off.

(n) Apart from the fact that the Company's cost of production was high in comparison with prices at which competitive marketing of their product was found possible during the year 1952, lack of finance (working capital) and pressure from the Bankers for repayment of the existing short-term advances aggregating about Rs. 7 lakhs was the Company's main difficulty, and with a view to easing the situation they have applied to the Industrial Finance Corporation, Delhi, for a loan of Rs. 20 lakhs which has not yet been sanctioned.

(o) Although a sum of Rs. 7,50,000 had been provided in the original estimates of capital structure towards working capital, the estimates under all other heads had so greatly exceeded anticipations that the provision was no longer available. The Travancore State Government who were approached for financial assistance were unable to assist. The British parent company of the managing agents would appear to have taken the view that they had gone far enough in their commitments with the Company, and could do nothing further to maintain and utilise production. The inevitable result of the failure of the Company to raise finance was the shut down of the plant since July, 1952 which has still continued.

(p) The monthly expenses of the Company for keeping the factory on care and maintenance basis have been about Rs. 20,000/- per month since 1st January, 1953. With the exception of the Managing Director (Technical) and the Secretary (non-technical), the staff are all Indian.

8.(a) The various raw materials required for the production of titanium dioxide are as follows:-

Raw materials

1. Ilmenite
2. Sulphuric acid
3. Scrap iron
4. Glue
5. Antimony oxide
6. Sodium sulphide
7. 'Icipol' Brilliant oil
8. Caustic soda (Electrolytic)
9. Soda ash
10. Monammonium phosphate
11. Zinc dust
12. Potassium sulphate
13. Titanium tetrachloride
14. Aluminium sulphate
15. Zinc oxide
16. Paper sacks (for packing).

Caustic soda is required for anatase as well as rutile type.

Titanium tetrachloride, aluminium sulphate and zinc oxide are required only for rutile type.

The following raw materials are imported:-

1. Titanium tetrachloride
2. Antimony oxide
3. Sodium sulphide
4. Monammonium phosphate
5. Potassium sulphate
6. Zinc dust.

The other raw materials are obtainable in India. The proportion (of the total value of raw materials) represented by indigenous materials is 95% for the anatase type and 84% for the rutile type.

(b) *Ilmenite:*

(i) Ilmenite deposits in crystalline rocks are found in Bihar and Rajputana, and occasionally in Nellore. Ilmenite in beach sand deposits are found in Travancore, parts of Ganjam and Cuttack districts in Orissa, on the Chowghat coast in Malabar, and in certain coastal tracts of Tirunelveli, Ramanathapuram, and Tanjore districts of Madras State. Some black ilmenite sand was also reported to have been discovered in the suburbs of Bombay and in the Konkan. Of all these deposits, those that have been commercially exploited are only the beach sand deposits of Travancore.

(ii) From a note compiled a few years ago by Dr. B.C. Roy of the Geological Survey of India, we understand that there was little or no demand for Travancore Ilmenite before 1924, but from that year the output has steadily increased as will be seen from the following table providing figures till the outbreak of the Second World War:-

Year	Tons	Value	Per ton (about Rs.)
1924	641	19196	30
1925	328	6543	20
1926	4236	101666	24
1927	17809	448136	25
1928	23307	556864	22
1929	23670	383267	16
1930	28776	445405	15
1931	36166	566878	16
1932	50053	773182	15
1933	52980	824427	16
1934	75644	521958	7
1935	127051	781894	6
1936	140477	830159	6
1937	181047	1126329	6
1938	252220	1546436	6
1939	237834	1495868	6

The following statement gives post-war figures relating to exports of ilmenite from India according to destination (as furnished by the Geological Survey of India) during 1947-1952:-

Year	Exports			Total	Value Rs.	Per ton (about Rs.)
	U.S.A..	U.K..	Others			
1947	255753	28949	Nil	284702	5652015	20
1948	206749	37446	3026	247221	6545217	26
1949	232249	32814	1000	266063	8029763	30
1950	201278	33193	6312	240783	5900132	24
1951	144985	40975	57851	243811	8241342	34
1952	(Not available)			174288	7242460	42

(iii) In the export market the Indian ilmenite has to compete with the products of Malaya, Norway, Canada and the U.S.A. The Travancore-Cochin ilmenite, particularly the Quilon grade, ranks very high in quality with a titanium dioxide (TiO_2) content of about 60%. The comparative figures of TiO_2 content in the different ores of the world are as follows:-

	Per cent.
Travancore	53.65
Quilon	60.98
Norwegian	43.77
Canadian	64.50
U.S.A.	50.26
Australian	46.28
Malayan	52.85

From information received from our overseas consulates we understand that (A) Japan is greatly in favour of Travancore ilmenite, second quality, but has not been able to obtain supplies and is therefore obtaining Norwegian ore, (B) Germany obtains her supplies also from Norway as freight charges are lower than from India, (C) U.S.A. producers have mining rights in ilmenite deposits in their own country as well as in Norway, but obtain about 50% of their requirements from India, and (D) over 75% of ilmenite consumed by U.K. producers has been obtained from India, Norway following with about 20% and Malaya with about 5%. We are also informed that Canada has embarked on large scale production of titanium dioxide from local ilmenite deposits which are reported to be rich in TiO_2 content.

(iv) There are at present three concerns engaged in working the mineral deposits in Travancore-Cochin State for export purposes, *viz.*,:-

(1) Travancore Minerals Concerns (Owned by Government);
(2) Hopkin & Williams (Travancore) Ltd. } Working as
(3) F.X. Pereira & Sons (Travancore) Ltd. } mining agents of the Govt.

The agreement between the private concerns and the State Government provides for the formers' appointment as the

Government's agent for mining and processing operations, and as an advisory committee to help the Government with their recommendations in deciding upon the qualities, the terms and destination of exports. Sales of the minerals are to be effected by the companies at the best price obtainable and the companies are to receive payment of a "basic charge" of Rs. 12/- per ton of ilmenite plus 25% of the difference between the naked at works selling price and the basic charge. (The basic charge is for cost of processing the ilmenite sands; it was originally fixed at Rs. 12/- per ton and was subsequently raised to Rs. 14.77 per ton. A further increase has been applied for and is under consideration, but meantime payments have been made on a provisional basis of Rs. 18/- per ton.) All the concerns have their own buildings, plant and machinery for processing the sands. The agreement is for a period of 20 years from 1946, but provides for its termination on payment of compensation by the Government for value of the installations surrendered and taken over.

(v) Besides the above agreement, there was another between the British Titan Products Co. Ltd., and the State Government according to which this company was permitted to obtain ilmenite to the extent of 50,000 tons annually at the ruling NAW (naked at works) price for each year (*vide* next paragraph). The arrangement was for a period of 5 years and expired on the 30th May, 1953. The Company have applied for renewal of the agreement and for an increase in their quota providing for an annual offtake of 75,000 tons. No decision is reported to have been taken in the matter.

(vi) We are informed by the Travancore State Government that the NAW prices of ilmenite for the last four years were as follows:-

1949-50	40 sh. per ton (Rs. 26-10-8)
1950-51	50 sh. per ton (Rs. 33- 5-4)
1951-52	65 sh. per ton (Rs. 43- 5-4)
1952-53	68 sh. per ton (Rs. 45- 5-4)

We are also informed that these prices were fixed with reference to the average world price, cost of production, charges for loading, freight, etc., and other similar, expenses. A statement showing the NAW price, the expenses under the various heads and world price for the years 1949-50, 1950-51, 1951-52 and 1952-53, obtained from the Travancore-Cochin State Government is appended below:-

Year	NAW price per ton	F.A.S. Kollmottam per ton.	Stevedoring and Sling hire.	F.O.B. Kollmottam per ton. (2 3 4).	Ocean freight insurance, etc., per ton.	F.O.B. Atlantic Sea-Board per ton (5 6).	World price F.O.B. Atlantic Sea-Board per ton.
1	2	3	4	5	6	7	8
	Sh.	Sh.	Sh.d.	Sh.d.	Sh.	Sh.	Sh.
1949-50	40	11	1-8	52-8	61.00	113.6	100.44/114.78
1950-51	50	11	1-8	62-8	89.00	151.6	100.44/114.78
1951-52	65	13	1-8	79-8	93.00	172.6	114.78/129.14
1952-53	68	14	1-8	83-8	93.00	176.6	130.00/145.00

(vii) The rate at which ilmenite is being supplied to the Travancore Titanium Products Ltd., is Rs. 48/10/9 NAW per ton, to which has to be added a sum of Rs. 11/4/3 on account of transport charges, delivery charges, sales tax and cost of gunnies. In the sum of Rs. 48/10/9 referred to, an amount of Rs. 18/- towards the "basic charge" (processing) is included. To effect economies in the cost of manufacture - a problem in which the Travancore State Government should be interested as the largest shareholder - we recommend that the sands which are Government property should be made available to the Company free of cost and that the "basic charge" alone should be recovered. If this concession is agreed to by the State Government, ilmenite would cost the Company only Rs. 29/- (basic charge Rs. 18/- and other charges Rs. 11/-), and a saving of Rs. 31/- on each ton of ilmenite could be effected. As

2.18 tons of ilmenite would be required for manufacturing a ton of titanium pigment a saving of Rs. 67.5 per ton in the manufacturing cost of titanium pigment would result from the concession.

(c) *Sulphuric acid:*

4.15 tons of 100% sulphuric acid are required for the production of each ton of titanium dioxide. The acid is now being supplied by Fertilizers & Chemicals (Travancore) Ltd., Alwaye, who manufacture the acid from the quota of imported sulphur allotted to the Travancore Titanium Products Ltd. The latest estimated quotation for sulphur c.i.f. Cochin is about Rs. 225/- per ton and the cost into godowns at FACT, Alwaye, would be Rs. 245/- per ton. The cost of 100% sulphuric acid supplied by FACT is made up as follows under the terms of an agreement drawn up in December, 1950:-

Cost of 100% H_2SO_4 per ton = cost per ton of imported sulphur x .375 *plus* Rs.46/- conversion charges and Rs. 11 profit.

Worked on the basis of the above formula the cost of sulphuric acid at Alwaye amounts to about Rs. 149/- to which should be added the freight from Alwaye to Trivandrum (about Rs. 32/-) resulting in a figure of Rs. 181/- per ton of acid. The Company have represented to us that it should be possible to effect a reduction in the price of the acid charged by FACT for two reasons: firstly, their acid manufacturing plant is a modern contact unit of which the labour and supervision charges must be extremely small so that almost the whole of the conversion charges must represent capital amortisation and other overheads; secondly, the conversion efficiency of such a plant is also very high so that the conversion factor of .375 in respect of the sulphur, instead of a generally accepted figure of .345, also represents additional profit to the supplier. The relatively high cost of sulphuric acid has been a major factor in the uneconomic operation of Travancore Titanium Products Ltd. As sulphur is now freely available and the Travancore-

Cochin Government are a major shareholder both in FACT and the Travancore Titanium Products Ltd., we recommend that they should investigate the possibility and desirability of revising the agreement at present subsisting between the two companies with a view to effecting a substantial reduction in the cost of sulphuric acid. A generous measure of relief to the Travancore Titanium Products Ltd., is undoubtedly indicated in this regard, specially as, in addition to having to pay for costly sulphuric acid they have also to incur freight charges of Rs. 31/- per ton from Alwaye to Trivandrum. At the present stage of the Company's development and considering their straitened financial circumstances it is not possible for them to erect a plant for the manufacture of sulphuric acid at their site.

In our report on Hydroquinone [*vide* paragraph 7(b)] we recommended that the cost of production of sulphuric acid in India should be examined, and, if necessary, suitable action should be taken under the Industries (Development and Regulation) Act to maintain the price of this essential material at a reasonable level. We reiterate this recommendation in this case also.

(d) *Titanium tetrachloride* is required to the extent of 0.0500 ton for manufacture of a ton of rutile titanium pigment. The cost of the material is about Rs. 2241 c.i.f. Cochin, landing charges, freight and insurance amounting to Rs. 50/- extra (Total Rs. 2291). The duty thereon at Rs. 27.3% *ad valorem* is Rs. 610/-. The incidence of the cost on each ton of manufactured pigment amounts to Rs.145/8/- of which duty comprises Rs. 30/8/-. The Company has asked for refund of duty on titanium tetrachloride consumed by them for the manufacture of the rutile type of pigment, and we recommend that this request be acceded to.

(e) Of the other raw materials, Scrap iron, Glue, Icipol brilliant oil, Caustic Soda (Electrolytic), Aluminium Sulphate, Soda Ash and Zinc Oxide are obtained from indigenous sources, while Sodium Sulphide, Antimony Oxide,

Monammonium Phosphate, Zinc Dust and Potassium Sulphate are imported from foreign countries.

9.(a) Titanium dioxide is manufactured from ilmenite ore by digestion with sulphuric acid, hydrolysis of the resulting solution and removal of all impurities. Anatase or rutile variety of titanium dioxide may be produced by certain variations in the operating conditions which determine the physical characteristics of the pigment. The details regarding the various stages of the process are given below:-

Process of manufacture.

(i) *Digestion:*

Ilmenite ore which is composed of a mixture of iron and titanium is dried and ground to a fineness of about 200 mesh and then digested with sulphuric acid. The resulting solution containing titanium sulphate and iron sulphate is treated with scrap iron in order to reduce the "ferric" iron into the "ferrous" state. About 2.18 tons of ilmenite, 4.15 tons of 100 per cent sulphuric acid and 0.24 ton of scrap iron are required for the manufacture of one ton of titanium dioxide pigment.

(ii) *Clarification and concentration:*

The solution is freed from all suspended impurities including unreacted ore and colloidal silica with the aid of coagulating agents such as glue, sodium sulphide and monopol oil. The clear solution is transferred to evaporators for concentration.

(iii) *Hydrolysis:*

The concentrated solution is transferred to precipitating tanks where it is boiled under controlled conditions so that titanium sulphate is converted into an insoluble titanium compound. Variation of conditions in respect of acidity, concentration and the quantity and quality of seed-crystals at this stage determines the physical characteristics of the final product so as to yield titanium dioxide of the anatase of the rutile variety.

For the production of rutile variety of titanium dioxide the seed-crystals are made from titanium tetrachloride and caustic soda. For the production of one ton of pigment, 0.05 ton of titanium tetrachloride and 0 06 ton of caustic soda are required.

(iv) *Filtration and washing:*

The precipitated pigment is concentrated in settling tanks and finally filtered and washed on a set of rotary filters. During this process the iron contained in the ilmenite, which is present in the precipitated pigment in the form of a solution of iron sulphate is removed.

(v) *Calcination:*

The filter cake is treated with a conditioning agent in the form of a potassium salt and calcined in a rotary kiln. The calcination temperature for the anatase variety of titanium dioxide is required to be about 900°C whereas a temperature of about 1000°C is required for the rutile variety.

(vi) *Grinding and packing:*

The material discharged after calcination is cooled, pulverised and packed. For the production of rutile variety of pigment the once-ground pigment is suspended in water and its surface coated with a metallic hydroxide after which it is dried in a steam drier and again ground before packing.

(b) According to the usual process of manufacture the solution after clarification is cooled to a low temperature for the separation of the by-product iron sulphate, in the form of copperas which finds an important use in the production of oxides of iron. Apart from yielding copperas as a by-product this procedure removes the bulk of iron from the solution so that only residual iron has to be removed in the later stages. The Travancore Titanium Products have not adopted this procedure because of the extra capital expenditure which would be required for the refrigeration plant. It is also possible to recover a

portion of the sulphuric acid from the hydrolysis stage so as to re-utilise it for digesting fresh quantities of ilmenite, thus economising in the use of sulphuric acid. The manufacturers stated that they would require additional capital of about Rs. 4 lakhs for setting up the plant for recovery of acid.

(c) We understand that considerable experimental work has been carried out abroad as well as at the National Chemical Laboratory, Poona, to examine the possibility of producing titanium dioxide by the hydrolysis of titanium tetrachloride under controlled conditions. The Director, National Chemical Laboratory, Poona, has informed us that the process could be economically operated with dry chlorine gas available from a caustic soda-chlorine plant at the rate of about 2 to 3 annas per lb. which would be a fair price for chlorine if the entire off-take of the gas could be utilised at site. This process is of special interest for the future development of the industry in India because it would help to conserve sulphuric acid for more essential uses as well as offer an outlet for the utilisation of a large quantity of chlorine. There is a surplus of chlorine, produced as a co-product in the caustic soda industry, for which the off-take is limited and it is necessary to explore possibilities of its utilisation. This new process, however, has not been operated on a commercial scale and we recommend that the National Chemical Laboratory should continue its research work on a larger scale to determine the operating details and establish the economic advantages of the process.

Demand.

10.(a) The domestic consumption of titanium dioxide (the figure for which for the reasons given below, may not represent total Indian requirements) during the years 1948 to 1951 was as follows:-

1948-49	... ...	143 tons
1949-50	... ...	95 tons
1950-51		228 tons

An estimate of the actual consumption of the titanium pigment during 1952, which has been arrived at by adding the total sales of anatase titanium dioxide by Travancore Titanium Products Ltd., the total imports of rutile titanium dioxide by the I.C.I. (India) Ltd., from the British Titan Products Ltd., and figures of imports from other sources abstracted from the daily import manifests at the ports, comes to 393 tons. The actual usage of the two types of titanium dioxide has been estimated to be, approximately, in the ratio of 3 anatase to 1 rutile.

(b) The consumption of titanium dioxide in India during the years 1948 to 1952 is not fully indicative of the possible demand from the various consuming industries for the reason that while it was in short supply till the end of 1951, its price was much too high during 1952, and the technical possibilities of utilising the pigment to the fullest extent in replacement of other white pigments such as lithopone, zinc oxide and white lead had not been adequately explored by the consuming industries. It should be mentioned here that titanium dioxide is essential for certain industries, and desirable for a large number of others. In the latter category the demand for the pigment is determined by the extent to which it could replace other white pigments which are already in use. We are referring here to the technological possibilities of such replacement. Such possibilities are again very largely governed by the price factor, *i.e.*, the relative cost at which the replacement of other white pigments could be effected by titanium dioxide. Even in computing the relative costs, due allowance has to be made for the improvement in the quality of the manufactured product resulting from the substitution of titanium dioxide for other pigments, but this, it should be understood, is largely dependent on the extent to which the improvement in qualities is appreciated by producers and consumers of the manufactured product. As an illustration we would mention that as a considerable proportion of bazar paints which are at present

pigmented with lithopone are purchased by consumers on the basis of properties (as for example, texture, consistency, feel to the finge and even tasce), which have no relation whatsoever to their value as paints, manufacturers of such bazar paints are reluctant to replace lithopone by titanium as such replacement may effect the properties mentioned above.

(c) In order to arrive at the future demand for titanium dioxide it is necessary firstly, to estimate the present demand for all the white pigments, and secondly to examine the possibilities of replacement of a portion of the other white pigments by titanium dioxide keeping in view the technical difficulties, if any, and the relative prices.

(i) *Demand for all white pigments:*

The Development Wing of the Ministry of Commerce and Industry have estimated the present requirements of lithopone, zinc oxide and white lead to be 3227 tons, 5080 tons and 1200 tons, respectively. They also estimate the current demand for titanium dioxide at about 500 tons and indicate that it is possible to step it up to about 1030 tons by certain measures.

The Travancore Titanium Products Ltd., estimate the demand for lithopone to be 2292 tons, for zinc oxide 2530 tons and for white lead 1200 tons. Their estimate for titanium dioxide is 420 tons (240 anatase and 180 rutile). The Imperial Chemical Industries (India) Ltd., however, estimate the demand for titanium dioxide at 924 tons (409 anatase and 515 rutile).

We are informed that the estimates furnished by the Development Wing of the Ministry are based on figures obtained from consuming industries and we, therefore, consider that these estimates are likely to be more realistic than the other estimates. It would thus seem that while the demand for titanium pigment based on current usage is of the order of 400 to 500 tons per annum it would

be possible to increase it to about 1000 tons by encouraging a gradual substitution of this pigment for other white pigments.

(11) *Possibilities of replacement:*

(A) *Lithopone:* It has been estimated by the Travancore Titanium Products Ltd., that with the exception of a few minor applications as in the case of some types of water paints where a manufacturer might have legitimate preference for lithopone, 90 per cent of lithopone used by the paint industry could be replaced by titanium dioxide without any detriment to the quality of the products, and, in fact, with considerable improvements in quality. Lithopone is not suitable for use in exterior paint because of its chalking propensity and inadequate durability. Anatase titanium dioxide is also prone to chalking, but rutile is not. Where lithopone is used in an interior paint it can be safely replaced by anatase titanium dioxide, and *a fortiori* by rutile titanium dioxide. The increased cost of rutile pigment compared with anatase will be fully offset by its superior quality which permits the use of a smaller proportion to achieve the same hiding power in the finished paint. The Paint Federation have, however, stated that in the case of certain ready-mixed paints and enamels, fillers, stoppers, distempers, etc., it is not possible to replace lithopone by titanium dioxide, but that substitution is possible in certain others. They also mention that lithopone has to be used in the manufacture of stiff paints for obtaining certain physical characteristics desired by the Indian market.

As regards the other industries which use lithopone, we are informed that 80% replacement by titanium dioxide is possible in the rubber industry (the balance 20% being reserved for the filling properties of lithopone) and complete substitution is possible in the printing ink, soap, cosmetics and leather industries.

More conservative estimates of the extent to which lithopone could be replaced by titanium pigments have also

been received and after examining these estimates, and taking into consideration the fact that paint manufacturers have been accustomed to the use of lithopone over a long period, that substitution of established formulations by new ones would require experience and investigation into the durability (in Indian climate) of new paints, and that the consumer has to be educated to appreciate the superiority of the product resulting from such substitution, we think that it should be possible to substitute about 75 per cent of lithopone by titanium dioxide in the near future. It should be noted that with the exception of one indigenous unit which manufactured lithopone to the extent of about 10 tons per year (and is stated to be in a position to increase its production to about 300 tons per year) there is no indigenous producer of lithopone in India, and the supply position of the pigment is, therefore, dependent almost entirely on foreign imports.

(B) *Zinc oxide* has been widely adopted as a basic pigment suitable for use with boiled linseed oil which has been the most popular paint medium in this country. Basic pigments such as zinc oxide and white lead react with the oil in such a way as to form a hard film. Zinc oxide also imparts fungicidal properties desirable in paints for use in hot conditions. Titanium dioxide being a chemically inactive pigment does not react with linseed oil and is not satisfactory, as the *sole* pigment in an oil medium. But it is not necessary that zinc oxide should constitute the whole of the pigment content to have its desired effect; indeed, a mixture of zinc oxide and rutile type of titanium dioxide yields a superior paint and is likely to prove economical when carrying out repainting. From the technological angle, therefore, it would seem that zinc oxide could be replaced by titanium dioxide to the extent of about 80 per cent but voluntary replacement to this extent is unlikely to take place, firstly, because all the zinc oxide that the country needs (and

more, in fact) could be produced in India, and secondly, because when the paint is of the paste variety and is sold by weight and not by volume, - a market practice which, although considered to be antiquated and not to the advantage of the consumer, is still prevalent in India to a large extent - it is more advantageous to the paint manufacturer to use zinc oxide rather than titanium dioxide. In consideration of the above, and the fact that zinc oxide has its own specific applications in certain other consuming industries as, for instance, rubber, we consider that a 25 per cent replacement of this pigment by titanium dioxide can be safely envisaged. This 25% should be calculated on the quantity that is required for the paint and printing ink industry estimated at 3500 tons. The balance of the demand, *viz.*, 1580 tons [5080 tons mentioned in sub-paragraph c(i) above less 3500 tons], is for uses for which titanium dioxide is not suitable.

(C) *White lead* is still the traditional pigment for wood primers for exterior paint systems and many finishing paints and undercoats are still produced in India with high contents of that pigment. We, however, understand that substantial replacement of white lead by rutile titanium dioxide could be advantageously undertaken in all cases. But, the same considerations that apply to zinc oxide apply also to white lead, and as it is also an indigenously produced pigment with an established bias in its favour in all paste-paint formulations, we would assume that voluntary replacement of this pigment by titanium dioxide may be possible only to the extent of about 25%.

(iii) *Function and effectiveness of white pigments:*

The main function of a white pigment when incorporated in an appropriate medium is to give opacity to the medium. The relative tinting strengths of the white pigments and the relative quantities needed to produce a required effect on the basis of "tinting strength" alone are stated to be as follows:-

Pigment	Tinting strength	Amount required relative to one part by weight of anatase TiO_2
Anatase TiO_2	1250	1
Rutile TiO_2	1600	0.78
Lithopone	300	4.2
Zinc oxide	200	6.3
White lead	100 to 160	8 to 12

Certain other factors, however, have also to be taken into account in determining the quantities of various pigments required to achieve the same result. Estimates of the amounts of the other pigment required relative to one part by weight of titanium dioxide have varied from 3 to 4.2 of lithopone, 4 to 6.3 zinc oxide and 4.5 to 12 of white lead, and we propose to accept, as a measure of caution, the most conservative of these estimates, viz., one of titanium dioxide as being equivalent to 3 of lithopone, 4 of zinc oxide and 4½ of white lead. In adopting this measure of caution we have been influenced by the fact that in our country a higher proportion of stiff paints of cheap quality with large proportions of extenders are in use, and the relative utility of the high tinting strength of titanium dioxide will be less in such paints than in liquid paints and enamels.

It is thus estimated that: (a) the demand for lithopone is of the order of 3000 tons, that 75% replacement of this pigment by titanium dioxide is possible, and that three parts of lithopone are equivalent to one part of titanium dioxide; (b) the demand for zinc oxide is of the order of 3500 tons, that 25% replacement of this pigment by titanium dioxide is possible, and that 4 parts of zinc oxide are equivalent to one part of titanium dioxide; and (c) the demand for white lead is of the order of 1200 tons, that 25% replacement of this pigment by titanium dioxide is possible, and that 4½ parts of white lead are equivalent to one part of titanium dioxide. Even so, it would not be entirely safe to deduce from these data that the demand for titanium dioxide as a result of

replacement of lithopone, zinc oxide and white lead would be 750 tons, 218 tons and 66 tons respectively in addition to the estimated demand of 400/500 tons in current usage. Apart from factors such as prejudice against a new product and lack of experience of its performance and suitability to Indian conditions, the price differential between titanium dioxide and the other pigments is of great importance. Titanium dioxide costs much more than other pigments, and can substitute the latter only if, after making allowance for its greater tinting strength (and consequently the comparatively lesser quantity of the pigment required in the process of substitution) it is available at competitive rates. There have been wide fluctuations in the prices of lithopone, zinc oxide and white lead during the last four years (as is indicated below) and such fluctuations might have serious repercussions on the future absorption of titanium pigment in the country.

(Per Cwt.)

	Lithopone Rs.	*Zinc oxide* Rs.	*White lead* Rs.
1949 ...	63	84	88
1950 ...	43/8/-	89	88
1951 ...	70 to 135	191 to 200	117 to 122
1952 ...	53 to 70	135 to 198	120 to 137
1953 ...	38 to 58	83 to 85	110

During the years 1952 and 1953 the price of indigenous anatase titanium dioxide ranged between Rs. 195 to Rs. 140 per cwt. while the rutile type was imported at about Rs. 157. When comparing the price of titanium pigment with those of the other white pigments allowance should be made also for the price of the extender to be used in conjunction with titanium dioxide as, for instance, blanc-fixe (price Rs. 40 per cwt.) (*vide* Appendix IV).

(d) *Assessment of demand for titanium dioxide:*

It will be evident from the foregoing that it is not possible to arrive at a firm estimate of the future demand for titanium pigment, based either on past consumption or on probable future trends. Conditions were not favourable

in the past for maximum usage of the pigment and the future off-take would seem to depend, mainly on a gradual process of technical development which can be encouraged by other measures recommended by us in the following paragraph. We, therefore, feel it safe to assume that, for the present, indigenous demand can be stepped up to 650 to 900 tons per annum. This does not include the requirements of the vitreous enamelware industry.

Factors governing the maintenance of demand.

11.(a) A point of importance in connection with the replacement of lithopone by titanium dioxide, as with the use of titanium pigment (rutile or anatase) generally, is the fact that in many applications the formulation has to include an extender like blanc-fixe. Imports of the required quantities of the material have not so far been permitted. To promote the use of titanium dioxide it would be necessary to ensure adequate supplies of a perfect white extender such as blanc-fixe. We may add that considerable quantities of white extenders have to be used with titanium pigment in most of the paint formulations.

(b) One reason why the use of titanium dioxide is on the increase in foreign countries is that they do not have enough supply of drying oils and would, therefore, like to use the raw materials derived from coal tar or petroleum which are readily available. The use of titanium dioxide in Indian paints will necessitate the greater use of varnishes or lacquers, the raw materials and solvents for which have to be imported. It would thus appear that, increased use of titanium dioxide may adversely affect the indigenous oil industry. We do not think, however, that the effect is likely to be appreciable as there will always be a sizable demand for paints manufactured in oil media. At the same time, lacquers and synthetic enamel paints being of superior quality the demand for them is likely to increase and the development of the domestic titanium industry will only be in keeping with this natural trend.

(c) The anatase type of titanium dioxide which was manufactured by T.T.P. Ltd., has not been found to be entirely acceptable by the paint industry. There is clear evidence of greater demand for the rutile type and the Company has already made the necessary alterations to their plant and machinery for the manufacture of rutile titanium dioxide. It is vital to the building up of a healthy market for the pigment that adequate supplies of the rutile grade should be available to meet the needs of consuming industries, and the Company should bear this in mind when arranging their production programmes.

(d) In order to stimulate the demand for titanium dioxide it will be necessary to provide the consuming industries with technical advice regarding the use of the pigment. It may also be necessary to sell the pigment in small lots ready mixed with extenders at some of the large consuming centres. We, therefore, recommend that the Company should maintain its own selling organisation and provide facilities for technical advice by appointing a sufficient number of technically qualified men at the major consuming centres in the country.

(e) Specifications for oil paste for paints and ready mixed paints for exterior and interior purposes, both white as well as tinted, were till recently, based on the use of lithopone, zinc oxide and/or lead oxide. Consequently, manufacturers were not encouraged to use titanium dioxide especially where purchases were made strictly on specifications as in the case of Government supplies. The Indian Standards Institution has recently re-drafted some of these standards for paints, providing alternative formulations which include the use of titanium pigment some of which are yet to be finalised. We recommend that this work should be completed as early as possible. A gist of re-drafted standard formulations is furnished in Appendix IV.

(f) Paints manufactured in India are sold by weight and not by volume as is the practice in most foreign countries. Producers of paints as well as large consumers agree that paints should be measured in terms of volume to avoid production of low quality paints containing large quantities of heavy extenders which, incidentally, do not add to the pigmentation but only increase the weight. The Indian Standards Institution expressed themselves in favour of a changeover and recommended that it should be brought about by legislation. An immediate step was taken by Government advising all official purchasing agencies at the Centre and in the States to effect purchases in terms of volume instead of by weight. The practice of sale by weight, however, still prevails with regard to most non-governmental transactions. We feel that it would be possible for the trade associations themselves, *viz.*, the Paint Federation and the Indian Paint Manufacturers Association to bring about a change in this practice by joint efforts. We recommend that Government should try to bring together the various interests with a view to securing a general acceptance of the practice of sale of paints by volume.

12.(a) *Titanium dioxide*: The installed capacity of the Travancore Titanium Products Ltd., is 1800 tons per annum.

Production.

Their actual production during the nine months of active working was 386.65 tons, while peak production was in November, 1951 to the tune of 75.15 tons. Only anatase titanium dioxide was produced as the plant was not designed for rutile production. The factory has now been equipped for undertaking production of the rutile type of pigment also, and future production programmes would be determined by market demand.

(b) *Lithopone*: This product, manufactured by heating together a mixture of barium sulphide and zinc sulphate, contains about 21 to 28% zinc sulphide, 70 to 72% barium sulphate and 1 to 1½% of zinc oxide. Barium sulphide may be produced from barytes which is available in the country

whereas zinc required for the production of zinc sulphate has to be imported. The India Alkalies Ltd., Calcutta, is reported to be the only unit manufacturing lithopone in the country. Since its inception in 1950 the factory has been producing about 10 tons of lithopone per annum. We are informed that current production is of the order of 5 tons per month, and that with additional equipment the capacity could be stepped up to 25 tons per month.

(c) *Zinc oxide:* Zinc oxide is produced by the direct oxidation of the metal in the form of ingots or scrap as well as from zinc ores. Zinc ingots are obtained from Australia, U.S.A., Belgium or East Africa.

There are at present two units in production, *viz.*, D. Waldie & Co. Ltd., Calcutta, and Kamani Metallic Oxides Ltd., Bombay, which started production early this year. The rated capacity and actual production of the two units are:-

	Rated capacity	*Actual production*				
		1948	*1949*	*1950*	*1951*	*1952*
D. Waldie & Co. Ltd.,	7/8000 tons per year.	5405	3218	4460	4860	2100
Kamani Metallic Oxides Ltd.,	1800 tons per year.	Current production 75 tons per month.				

We are informed that the Murarka Paint & Varnish Co. Ltd., have a plant for production of zinc oxide but details of their capacity and production are not available. Indigenous production of the pigment fully satisfies the country's requirements.

(d) *White lead:* White lead is produced from metallic lead which is allowed to react with acetic acid in association with moist air and carbon dioxide. Lead required for the purpose has to be imported from abroad, while the acid is available from indigenous sources.

D. Waldie & Co. Ltd., Calcutta, have a plant for manufacturing white lead with a capacity of 2500/3000 tons per annum. Actual production since 1948 was as follows:-

1948	...	...	...	1547 tons
1949	...	...	...	905 "
1950	...	...	...	1110 "
1951	...	...	...	800 "
1952	...	...	...	250 "

We understand that Associated Pigments Ltd., Calcutta, also have a plant with a capacity of 30 tons per month. Apart from being used in small quantities as cementing material, white lead is mostly consumed by the paint industry.

Quality of indigenous titanium dioxide.

13. (a) Since only the anatase variety has been produced so far by the Travancore Titanium Products Ltd., opinions regarding the quality of their product obtained from various consuming interests relate only to this variety. Except for one opinion which mentions the product as possessing covering power inferior to the imported product, apparently because of a difference in the size of the particles, and another which characterises the shade as being less white, there is general agreement that the quality of the indigenous product is as good as that of the imported pigment.

(b) We understand that the Paints & Allied Products Sectional Committee of the Indian Standards Institution has issued standard specification for titanium dioxide for paints and that the standard covers titanium dioxide of both anatase and rutile types.

Imports and import control policy.

14. Imports of titanium dioxide are not separately shown in the Accounts relating to the Foreign (Sea, Air and Land) Trade and Navigation of India. The Collectors of Customs, Bombay, Calcutta and Cochin have, however, furnished the Commission with the quantity and value of imports of titanium dioxide at their ports during 1951 and 1952. Similar information for Madras is not available. Actual imports at Bombay, Calcutta and Cochin are given below:-

Sl. No.	Name of the port	Imports			
		1951		1952	
		Quantity	Value	Quantity	Value
		Tons	Rs.	Tons	Rs.
1.	Bombay	73.80	2,17,464	25.15	58,652
2.	Calcutta	116.30	2,95,209	111.66	3,17,092
3.	Cochin	3.00	13,585	1.00	986
		193.10	5,26,258	137.81	3,76,730

We recommend that statistics relating to the imports of titanium dioxide should be maintained separately by Collectors of Customs and the Director General of Commercial Intelligence and Statistics.

Till the Travancore Titanium Products came into production imports were regulated according to the availability of foreign exchange. Since July-December, 1952, Government have been regulating the imports so as to help the Travancore Titanium Products to market its products in the country. At present licences for the import of titanium dioxide and lithopone are issued on *ad hoc* basis to actual users on the merits of each case. Appendix V gives the import control policy since January-June, 1951.

Existing rates of customs duties.

15. The relevant extracts from the Indian Customs Tariff Schedule (37th Issue), showing the description of the items concerned and the rates of duties thereon are given below:-

(statement on Page 39)

Titanium dioxide and other white pigments are classified in the following manner in the first schedule to the Indian Customs Tariff:-

Name of the article	*I.C.T. Item No.*
1. Titanium dioxide	30
2. Lithopone	30(12)
3. Zinc oxide	30(2)(c)
4. White lead	30(2)(b)

Item No.	Name of article	Nature of duty	Standard rate of duty	Preferential rate of duty if the article is the produce or manufacture of :-			Duration of protective rates of duty
				The U.K.	A British Colony	Burma	
30	Paints, colours and printers' materials, all sorts, not otherwise specified.	Preferential revenue.	37-4/5 per cent *ad valorem*.	25-1/5 per cent *ad val.*	-	10½ per cent *ad valorem*.	
30(2)	Paints, colours and printers' materials, the following, namely:-						
	(a) white lead, genuine dry.	-do-	30 per cent *ad valorem* or Rs. 5/12/- per cwt. whichever is higher plus one-fifth of the total duty.	24 per cent *ad val.*	-	10 per cent *ad valorem*.	
	(b) Zinc white, genuine dry.	-do-	30 per cent *ad valorem* or Rs. 6/- per cwt. whichever is higher plus one-fifth of the total duty.	-do-	-	-	
30(12)	Lithopone*	-do-	30 per cent *ad valorem*.	-do-	-	10 per cent *ad valorem*.	

*These are GATT items.

Claim of the industry to protection and/or assistance.

16. In assessing the claim of the industry to protection and assistance the main considerations that have to be taken into account are:-

(a) Titanium dioxide is an essential industrial raw material with wide applications in the paint industry all over the world. Its increased usage will tend towards the production of better quality paints.

(b) The principal raw material for the manufacture of the pigment, *viz.*, ilmenite is available in large quantities in the country and is considered to be of superior quality to that available in other countries. Some of the other minor raw materials are at present imported but there is every chance that, later, they may be produced inside the country. The same position does not obtain in the case of the other alternative pigments like zinc oxide, lithopone and white lead. Zinc and lead are commodities with highly fluctuating market prices and such fluctuations affect the prices of the relative white pigments.

(c) The Travancore Titanium Products Ltd., are at present handicapped by the very restricted market in the country. Their high costs of production result from high costs of sulphuric acid and certain other materials and the low volume of production. Under existing conditions it is not possible for the Company to operate successfully without protection or assistance.

(d) To enable the Company to utilise a larger proportion of their capacity assistance is necessary by creating a demand for the pigments by gradual replacement of other white pigments by titanium dioxide. Increased production would result in lower costs with beneficial results to the indigenous consumer. It is possible to build up even an export market.

(e) There is every possibility of the Company developing sufficiently within a reasonable time to be able to carry on successfully without protection or assistance.

(f) The grant of protection and assistance to the Company will not be detrimental to the interests of the consumer or of consuming industries. On the other hand, we expect far reaching benefits to accrue from increased usage of titanium pigments.

Cost of production and fair selling price.

17.(a) The usual procedure of deputing our Cost Accounts Officer for working out costs of production could not be followed in this case as the factory of the Travancore Titanium Products Ltd., was in production only for six months, and was shut down in June last year since when it has been on care and

maintenance basis. We, therefore, obtained from the Company cost data and all relevant particulars in detail and had them examined by the Commission's Technical Adviser and Cost Accounts Officer. It was felt that under the items Materials for maintenance, Labour for maintenance, Overheads and establishment charges, there was some scope for economy; the Managing Director was requested to make efforts to effect these and other economies in operating costs. To regularise our acceptance of the cost estimates despite the economies considered possible, we have made due allowance for such economies in determining the quantum of assistance recommended for the Company [in para, 20 (c) below].

The final set of estimates based on the production rates of 650 tons per annum, 1200 tons per annum and 1800 tons per annum are dealt with hereunder.

(i) *Estimate at production rate of 650 tons: (With full depreciation and return @6%).*

	Anatase Rs.	*Rutile* Rs.
Raw materials	971.5	1217.2
Power and fuel	367.9	438.0
Labour	103.0	103.0
Repairs and maintenance:		
Materials (*Anatase* 120.0, *Rutile* 132.0)		
Labour (*Anatase* 77.3, *Rutile* 77.3)	197.3	209.3
Consumable stores	12.0	12.0
Establishment	250.7	250.7
Depreciation at full rates	889.5	889.5
Overheads	215.2	215.2
Packing materials	35.0	35.0
Interest on working capital (Rs.5 lacs @6½%)	34.6	34.6
Return @6%	674.0	674.0
Ex-works price	3750.7	4078.5
Add Selling expenses	239.0	239.0
Fair selling price	3989.7	4317.5
	(Say Rs.199/8 per cwt.)	(Say Rs.215/12 per cwt.)

In the above estimate return has been calculated on the Company's paid up capital of Rs. 73 lacs and not on the gross block of Rs. 67.10 lacs [Para. 7(f)]. A return at, say, 8% on the gross block would work out to Rs.5,36,800 while at 6% on the paid up capital it would be Rs. 4,38,000. In the special circumstances of this industry, and considering the desirability of maintaining the prices of their product at the minimum economic level, we have considered it reasonable to base our calculations on the lower figure.....

(With half depreciation and return @3%)

If depreciation is allowed only upto half of the full extent permissible and return is calculated only at 3%, the ex-works prices and fair selling prices will be as follows:-

		Anatase	*Rutile*
Ex-works prices at full rates		3750.70	4078.50
Less half depreciation	Rs.449.75		
Less half return	Rs.337.00	786.75	786.75
		2963.95	3291.75
		(i.e. Rs.148.19 per cwt.)	(i.e., Rs.164.59 per cwt.)
Fair selling prices worked at full rates		3989.70	4317.50
Less half depreciation	Rs.449.75		
Less half return	Rs.337.00	786.75	786.75
		3202.95	3530.75
		(Say Rs.160/- per cwt.)	(Say Rs.176/8 per cwt.)

(ii) *Estimates at production rates of 1200 and 1800 tons:*

(With full depreciation and return @6%)

After allowing for depreciation at full rates and full return, the fair selling prices at 1200 tons and 1800 tons per annum are estimated to be:-

	1200 tons	*1800 tons*
Anatase	About Rs.150/- per cwt.	About Rs.125/- per cwt.
Rutile	About Rs.167/- per cwt.	About Rs.140/- per cwt.

(With half depreciation and return @3%)

After allowing for half depreciation and half return the fair selling prices are estimated to be:-

	1200 tons	*1800 tons*
Anatase	About Rs.129/- per cwt.	About Rs.111/- per cwt.
Rutile	About Rs.146/- per cwt.	About Rs.127/- per cwt.

(b) Since the demand for titanium pigments of both types during the coming year is likely to be between 650 to 900 tons, we think that the Company's fair selling price in the immediate future should be considered on the basis of a production of 650 tons. After making full provision for depreciation, overheads, interest on working capital, and return at 6%, the fair selling price of anatase titanium dioxide will be Rs. 199/8/- per cwt. while that of rutile titanium dioxide would be Rs. 215/12/- per cwt. These prices are very much on the high side not only in comparison with the prices at which the pigments could be imported from other countries (say, Rs. 140/150 per cwt.) but also as compared to the prices at which alternative pigments are now available. The high costs of production are primarily due to the heavy capital expenditure involved in erecting the plant and the resultant large provisions required for depreciation and return. One possible way of reducing this burden would be by writing down the capital. We have considered this remedy from various angles but do not think that it is called for at this juncture. Firstly, the conditions under which the Company could maintain full production and market their products have not existed so far. Secondly, the climate for the successful conduct of the enterprise has yet to be created and, thirdly, when the Company attains full production the cost of manufacturing the pigment could be maintained at easy marketable level even after making full provision for depreciation and return. We, therefore, think that, for the present, it is sufficient to provide for depre-

ciation at only half the level permissible under normal conditions, and for return at only 3% on the paid up capital. With these adjustments the fair selling prices per ton of anatase titanium dioxide would be about Rs. 3200 (Rs. 160 per cwt.) and that of rutile would be about Rs. 3530 (Rs. 176/8/- per cwt.).

C.i.f. prices and landed cost.

18. The statement in Appendix VI gives the available data regarding the c.i.f. prices and landed costs of titanium dioxide as furnished by the Collectors of Customs and certain importing firms. For anatase type we have adopted the c.i.f. price of Rs. 105/11/8 per cwt. which related to a consignment received by I.C.I. (India) Ltd., Calcutta, from U.K. in January, 1952. As regards the rutile type, the c.i.f. price of Rs. 116/12/11 per cwt. relating to a consignment received by the same firm in August 1952 has been adopted. We have rejected certain lower quotations mentioned in the statement referred to above as they related to certain special grades not fully comparable with the indigenous product.

Comparison of the ex-works price with landed costs.

19. A comparison of the landed costs of the imported product with the ex-works price of the indigenous product for both anatase and rutile grades is given below. For reasons given in paragraph 17(b) above we have adopted the ex-works price calculated on an output of 650 tons with provision only for half depreciation and half return on block.

Per cwt.

	Anatase	*Rutile*
1. C.i.f. price	105.73	116.81
2. Customs duty @25.2%	26.64	29.44
3. Clearing charges @2½%.	2.64	2.92
4. Landed cost with duty	135.01	149.17
5. Landed cost without duty	108.37	119.73
6. Ex-works price	148.19	164.59
7. Difference between (6) and (5) . .	39.82	44.86
8. The above difference as a percentage of the c.i.f. price.	37.66 per cent.	38.40 per cent.

20. (a) On the basis of the above mentioned calculations the quantum of duty required to protect indigenous titanium dioxide (anatase as well as rutile) against the pigment imported from U.K. at levels assumed by us works out to about 38%, as against the existing preferential revenue duty of 25.2%. But a protective duty by itself will not solve the problems of this industry, and increasing the price of the imported pigment by a protective duty with a view to sustaining the high price of the indigenous pigment is not the solution. We have mentioned in paragraph 7(b) that the Company placed their pigment on the market at Rs. 195/- in 1952, and, finding the off-take to be very poor, had to reduce the price in two stages to Rs. 140/- in order to sell their stocks. In analysing the question of demand in paragraph 10 we have explained that the off-take of titanium dioxide will depend, not merely on the extent to which it is able to replace other pigments technologically, but also on its being made available to consuming industries at prices comparable to those of the alternative pigments and also, provided its usage with extenders in alternative formulations does not involve increased costs. The prerequisite for ensuring these requirements is to maintain the selling prices of the anatase and rutile type of the pigments at or below Rs. 140/- and Rs. 154/- per cwt. respectively, which, by a process of trial and error, the Company discovered to be the optimum prices at which titanium dioxide could be marketed under existing conditions. These prices would appear to approximate to the landed costs of the imported pigment of both types after adding selling expenses thereto.

Scheme of protection.

(b) We, therefore, recommend that:-

(i) although the quantum of preferential duty indicated on the basis of a comparison of the landed cost of titanium dioxide with the ex-works cost of the indigenous pigment is 38 per cent., protective duty at only the existing rate of 25.2 per cent. *ad valorem* (preferential) should be imposed on titanium dioxide, the standard rate of duty being fixed in accordance with the terms of the Indo-British Trade Agreement, 1939 and, in addition,

(ii) a subsidy should be granted to the Travancore Titanium Products Ltd. to enable them to keep their selling prices of anatase and rutile titanium dioxide at or below the above mentioned optimum prices of Rs. 140/- and Rs. 154/- per cwt. respectively.

(c) In para. 17(b) above we have mentioned that after providing for depreciation at half the level permissible, and for return at 3 per cent instead of at 6 per cent, the fair selling price to the Company of titanium dioxide would work out to Rs.160/-per cwt. for anatase type and Rs. 176/8/- per cwt. for rutile type. The optimum prices at which the two types of the pigments are saleable under existing conditions are Rs. 140/- per cwt. for anatase and Rs. 154/- per cwt. for rutile. The fixation of the protective duty at the existing rates, as recommended above, will also enable the Company to realise prices at about those levels only. It is, therefore, necessary to grant a subsidy to the Company to bear the difference, for calculating which we shall assume the mean between Rs. 160/- and Rs. 176/8/-, viz., Rs. 168/4/- per cwt. and that between Rs. 140/- and Rs. 154/- viz., Rs. 147/- per cwt. The difference between the two mean figures amounts to Rs. 21/4/- per cwt. for which provision has to be made in the form of a subsidy, but this would be lessened by the concessions recommended by us in respect of ilmenite, sulphuric acid and titanium tetrachloride [*vide* paragraphs 8(b)(vii), 8(c) and 8(d)], and by certain economies in operating costs referred to in paragraph 17(a). We have, therefore, reduced the figure for which provision has to be made by Rs. 6/4/- per cwt. and recommend that a subsidy of Rs. 15/- per cwt. or Rs. 300/- per ton should be granted to the Company on their actual sales of anatase and rutile types of the pigment. The total amount of this subsidy should be subject to a maximum of Rs. 2,70,000 per year which will be sufficient to cover the Company's losses on a production of 900 tons. Any increase in production above this figure will bring about a fall in the cost of production, and will necessitate a review of this scheme. The internal demand is, however, unlikely to exceed 900 tons per year in the near future.

(d) The funds required for the payment of the subsidy should be raised by levying a surcharge on exports of ilmenite at the rate of Rs. 2/- per ton. Exports of ilmenite amounted to about 174,000 tons in 1952 and on this basis the sum of about Rs. 3,50,000 realised from the levy should be sufficient to provide for the subsidy and the administrative expenses involved, and would also allow a margin for contingencies. We are satisfied that the levy of an export surcharge of Rs. 2/- per ton will not adversely affect the overseas demand for the ore since its effect on the cost of manufacture of titanium pigments in the importing countries will be negligible. So far as the British Titan Products Ltd., are concerned they have a holding of 22 per cent in the Travancore Company and the small extra cost to be borne by them for obtaining ilmenite would be more than compensated by the improvement in the Company's financial position. As regards the U.S.A., we are informed that the production of ilmenite in that country is only half of its total needs, and the quality is also inferior. We have in this connection taken due account of the views expressed by the Consul-General of India in New York in his letter dated 13th February, 1952 to the Ministry of States, Government of India, on the subject of ilmenite prices in the United States. The Consul-General is of the opinion that Indian ilmenite enjoys a strong competitive position in the United States, but that the fixation of the price at too high a level might be undesirable. We do not think that the surcharge proposed by us would push up the price to a level which may be considered too high. It will be seen from the statement furnished in paragraph 8(b)(vi) that the price of Indian ilmenite f.o.b. Atlantic Sea-board could bear an increase, because of the superior quality of the ore, from 113.6 sh. per ton in 1949-50 to 176.6 sh. per ton in 1952-53 while the world price increased from 110/115 sh. to 130/145 sh. only per ton during the same period. The representatives of the Travancore Government who attended the public inquiry did

not only express any apprehensions about the proposed levy of a surcharge on exports of ilmenite. We consider further, that while there is no serious risk of exports of ilmenite being adversely affected by the suggested levy, even if the export trade in the ore were to suffer a small temporary reduction, the loss is likely to be more than compensated by the benefit to the national economy which would accrue from the development of the titanium dioxide industry. We are satisfied that for the sake of developing this important industry, it is worth while taking a small risk, for a limited period, with regard to the exports of ilmenite which, after all, forms part of the exhaustible mineral wealth of the country. According to information received by us other producing countries like U.S.A. are trying to conserve their deposits of the ore while utilising supplies from outside sources for manufacturing titanium pigment.

(e) We recommend that if the subsidy is granted, the Travancore Titanium Products Ltd., should be required to maintain their selling prices of titanium pigments for internal consumption at or below the mean level of Rs. 147/- per cwt. indicated above. [Rs. 140/- per cwt. for anatase and Rs. 154/- per cwt. for rutile]. Should the Company find it necessary to increase their selling prices above these rates they should do so only with the prior approval of the Government of India.

(f) We recommend that the duty-cum-subsidy scheme recommended by us should remain in force until 31st December, 1954, and an examination of the fair ex-works cost should be undertaken by the Commission after about a year from now when the whole position should be reviewed. A new heading "Titanium dioxide" should be opened in the First Schedule to the Indian Customs Tariff.

(g) The Company have assured us that they will be able to resume production of anatase titanium dioxide within 3 months after the announcement of Government's decision on this report, and to switch over to rutile titanium dioxide

after 2 months of anatase production. It will, therefore, be necessary to continue the existing import policy regarding lithopone and anatase titanium dioxide for a period of 3 months after the announcement of Government's decisions on this report and that relating to rutile type for a period of five months. Thereafter on receipt of an assurance from the Company that sufficient stocks for internal needs have been built up, imports of titanium dioxide can be discontinued, and those of lithopone can be restricted more severely than at present.

(n) The Company's immediate problem is to raise sufficient finance for working capital. We feel that if the above recommendations are accepted, the prospects of this enterprise would improve sufficiently to enable it to raise the necessary funds on reasonable terms.

21. Our conclusions and recommendations are summarised below:-

Summary of conclusions and recommendations.

(1) Imports of the special type of titanium pigment required by manufacturers of vitreous enamelware should be permitted to the extent of their actual requirements. [Paragraph 4(b)]

(2) The Travancore-Cochin State Government should supply ilmenite to the Company after recovering from them only the "basic charge" for processing the sands. [Paragraph 8(b)(vii)].

(3) The Travancore-Cochin State Government should take steps to reduce the cost at which sulphuric acid is being supplied to the Company by the Fertilizers and Chemicals (Travancore) Ltd., Alwaye. [Paragraph 8(c)]

(4) The cost of production of sulphuric acid in India should be examined and, if necessary, suitable action should be taken under the Industries (Development and Regulation) Act to maintain the prices of this essential material at a reasonable level. [Paragraph 8(c)]

(5) Refund of customs duty on titanium tetrachloride used by the Company as raw material should be made. [Paragraph 8(d)]

(6) The National Chemical Laboratory, Poona, should continue its research work relating to the production of titanium dioxide by the hydrolysis of titanium tetrachloride under controlled conditions, determine the operating details and establish the economic advantages of the process with a view to the utilisation of a large quantity of chlorine and the conservation of sulphuric acid. [Paragraph 9(c)]

(7) The consumption of titanium dioxide in India in the past few years is not fully indicative of the possible absorption of the pigment by the various consuming industries as the technical possibilities of utilising it to the fullest extent had not been adequately explored. [Paragraph 10(b)]

(8) The current demand for titanium dioxide in India is about 400 to 500 tons, while that for lithopone, zinc oxide and white lead is about 3227 tons, 5080 tons and 1200 tons, respectively. [Paragraph 10(c)(i)]

(9) Technical possibilities and other relevant factors having been considered, it is estimated that lithopone, zinc oxide and white lead can be replaced by titanium dioxide to the extent of 75 per cent, 25 per cent, and 25 per cent, respectively of their current consumption. One part by weight of titanium dioxide is equivalent to 3 parts of lithopone, 4 parts of zinc oxide and 4½ parts of white lead. [Paragraph 10(c)(ii) & (iii)]

(10) Even with the available technological and statistical data it is not possible to arrive at a firm estimate of the extent to which titanium dioxide would be used in substitution of other white pigments as several other factors have to be taken into consideration. [Paragraph 10(c)(iii)]

(11) It is safe to assume that, for the present, indigenous demand for titanium dioxide, both anatase and

rutile, can be stepped up to 650 to 900 tons per annum. [Paragraph 10(d)]

(12) Adequate supplies of blanc-fixe or similar extenders should be ensured to all users of titanium dioxide who are in need of such extenders. [Paragraph 11(a)]

(13) The use of titanium dioxide would result in the greater use of varnishes and lacquers, whereby the indigenous oil industry may be affected. However, lacquers and synthetic enamel paints being of superior quality the demand for such paints is likely to increase so that the development of the domestic titanium dioxide industry will only be in keeping with this natural trend. [Paragraph 11(b)]

(14) It is vital to the building up of the titanium pigment industry in India that adequate supplies of both types, anatase as well as rutile, should be continuously maintained. [Paragraph 11(c)]

(15) The Travancore Titanium Products Ltd., should maintain its own selling organisation at the major consuming centres in the country and provide facilities for technical advice by appointing qualified men at such centres. [Paragraph 11(d)]

(16) The Indian Standards Institution should be requested to complete the work of providing paint formulations requiring the inclusion of titanium pigments. [Paragraph 11(e)]

(17) The practice of purchasing paints by weight and not by volume could be changed by the joint efforts of the concerned trade associations. Government should bring together the various interests concerned with a view to securing the general acceptance of the practice of sale of paints by volume. [Paragraph 11(f)]

(18) Statistics relating to imports of titanium dioxide should be maintained separately by Collectors of Customs and the Director General of Commercial Intelligence. [Paragraph 14]

(19) Every endeavour should be made by the Company to effect economies in operating costs under all possible heads. [Paragraph 17(a)]

(20) A protective duty at the existing preferential rate of 25.2 per cent *ad valorem* should be imposed on titanium dioxide and the standard rate fixed in accordance with the terms of the Indo-British Trade Agreement, 1939. [Paragraph 20(b)(i)]

(21) A subsidy of Rs. 300/- per ton on sales of titanium dioxide of both types should be paid to the Company subject to a maximum of Rs. 2,70,000 per year. [Paragraph 20(c)]

(22) A surcharge of Rs. 2/- per ton on exports of ilmenite should be levied and the subsidy referred to in paragraph 20(c) should be paid from the amount so realised. [Paragraph 20(d)]

(23) The Company should maintain their selling prices of titanium pigments at or below Rs. 140/- per cwt. for anatase and Rs. 154/- per cwt. for rutile. No increase in their selling prices should be made except with the prior approval of the Government of India. [Paragraph 20(e)]

(24) The duty-cum-subsidy scheme should remain in force until 31st December, 1954, and a review of the case should be undertaken by the Commission before the end of 1954. [Paragraph 20(f)]

(25) It will be necessary to continue the existing import policy regarding lithopone and anatase titanium dioxide for a period of 3 months after announcement of Government's decisions on this report and that relating to rutile type for a period of 5 months. After the availability of sufficient stocks of titanium dioxide to meet internal demand has been assured by the Company, imports of titanium dioxide can be discontinued, and those of lithopone can be restricted more severely than at present. [Paragraph 20(g)]

22. We wish to express our thanks to the representatives of the manufacturers, importers and consumers for furnishing us with valuable information and giving evidence before us. Our thanks are also due to Mr. N. Srinivasan of the Ministry of Commerce & Industry (Development Wing), the representatives of the Travancore-Cochin State Government, Dr. K.L. Moudgill of the Indian Standards Institution, and Dr. J. Gupta of the National Chemical Laboratory, Poona, who were present at the inquiry and provided us with valuable information and assistance.

Acknowledgements.

B.V. Narayanaswamy,
Member.

B.N. Adarkar,
Member.

C. Ramasubban,
Member.

D.K. Malhotra,
Secretary.

Bombay,
Dated 29th July, 1953.

APPENDIX I

[*Vide* paragraph 1]

GOVERNMENT OF INDIA
MINISTRY OF COMMERCE AND INDUSTRY

New Delhi, the 15th November, 1952.

RESOLUTION
(Tariffs)

No. 1-T(21)/52.- In pursuance of Section 11 of the Tariff Commission Act, 1951 (L of 1951), the Central Government hereby refers to the Tariff Commission for enquiry and report the question of the grant of protection (whether by the grant of subsidies or the levy of protective duties or in any other suitable form) for the encouragement of titanium dioxide (titanium pigments) manufacturing industry in India.

2. In conducting the enquiry the Commission will be guided by the principles laid down in Section 14 of the said Act. In doing so the Commission will also take into consideration:

(1) the demand for 'anatase' and 'rutile' titanium dioxide pigments in the country by all consuming industries;

(2) how far other pigments such as lithopone can be replaced by indigenous titanium dioxide; and

(3) the extent of imports of other competing commodities such as white pigments.

3. Any person, firm or company interested in the industry or in any industry dependent on the use of titanium dioxide pigments who desires that his or its views should be considered by the Tariff Commission may make a representation in writing to the Commission which should be addressed to the Secretary to the Commission, Contractor Building, Nicol Road, Ballard Estate, Bombay-1.

Sd./- K. N. KAUL,
Joint Secretary to the Government of India.

APPENDIX II

[*Vide* paragraph 3(a)]

List of firms and bodies to whom the Commission's questionnaires were issued and from whom detailed replies or memoranda were received.

* Those who replied in detail.
@ Those who sent memoranda.

PRODUCERS:

*1.	Travancore Titanium Products Ltd.; Kochu Veli, Trivandrum, Travancore-Cochin State.	(Producer of titanium dioxide)
*2.	India Alkalies Ltd., 5, Garstin Place, Calcutta.	(Producer of lithopone)
*3.	Kamani Metallic Oxides Ltd., Kamani Chambers, Nicol Road, Ballard Estate, Bombay.)	(Producer of zinc oxide)
4.	Murarka Paint & Varnish Works Ltd.; P.O. Sodepur, 24-Parganas, Calcutta.	(Producer of zinc oxide)
*5.	D. Waldie & Co. Ltd.; Clive Buildings, P.O. Box No. 174, Netaji Subhas Road, Calcutta.	(Producer of zinc oxide and white lead)
6.	Associated Pigments Ltd.; 14, Netaji Subhas Road, Calcutta.	(Producer of white lead)

Note:- The standard questionnaire was issued to only No. 1 in the list while others were asked only to furnish information regarding their rated capacity and their actual production during the years 1950, 1951 and 1952.

IMPORTERS:

*1. New Standard Chemicals Co. Ltd.;
28, Samuel Street, Vadgadi, Bombay.

2. Chika Ltd.;
Poonajaji Building, Opp. Princess Dock, Frere Road, Bombay.

3. Bangur Bros.;
14, Netaji Subhas Road, Calcutta.

IMPORTERS (Contd.)

*4. Imperial Chemical Industries (India) Ltd.;
P.O. Box No. 182, 18, Strand Road, Calcutta-1.

*5. Addisons Paints and Chemicals Ltd.;
Sembiam, Madras-11.

6. Sepulchre Bros. (India) Ltd.;
Taj Building, 210, Hornby Road, Bombay.

*7. P.C. Chanda & Co. Ltd.;
P2, Mission Row Extension, Calcutta-1.

8. Noble Paint & Varnish Co. Ltd.;
Fergusson Road, Lower Parel, Bombay-13.

9. Macfarlane & Co. Ltd.,
18, Tangra Lane, Entally P.O., Calcutta 14.

10. Hoyle Robson Barnett & Co. (India) Ltd.;
Konnagar, Hoogly (District), Calcutta.

CONSUMERS:

(a) *Paint manufacturers:*

*1. Indian Paint Manufacturers Association,
23-B, Netaji Subhas Road, Calcutta-1.

*2. Paint Federation,
Royal Exchange, P.O. Box No. 280, Calcutta-1.

3. Elephant Oil Mills Ltd.;
P.O. Box No. 663, Rustom Building, Churchgate Street, Bombay.

4. Goodlass Wall Ltd.,
Fergusson Road, Lower Parel, Bombay.

5. Lakaki Works Ltd.;
Lonavla, Poona (District), Bombay State.

6. Mercury Paint & Varnishes Ltd.;
Cadell Road, Agar Bazar, Bombay.

7. Hindustan Paints, Colour and Varnish Works,
Katni, Jubbulpore District.

*8. Addisons Paints and Chemicals Ltd.;
Sembiam, Madras-11.

9. Titan Paints Varnish Co. Ltd.,
Podanur, Coimbatore (District), South India.

10. Nagrath Paints Ltd.;
46, Fazal Ganj, Kanpur.

11. Alkali & Chemical Corporation of India Ltd.;
18, Strand Road, Calcutta-1.

12. British Paints (India) Ltd.;
32, Chowringhee Road, Calcutta-16.

CONSUMERS (Contd.)

13. Calcutta Paints, Colour and Varnish Co. Ltd.;
8, Chunnapukur Lane, Bow Bazar P.O., Calcutta.

14. Hoyle Robson Barnett & Co. (India) Ltd.;
Konnagar, Hoogly (District), Calcutta.

15. Jenson & Nicholson (India) Ltd.;
2, Fairlie Place, Calcutta-1.

16. Macfarlane & Co. Ltd.,
18, Tangra Lane, Entally P.O., Calcutta-14.

17. P.C. Chanda & Co. Ltd.,
P-2, Mission Row Extension, Calcutta.

18. Shalimar Paint, Colour & Varnish Co. Ltd.;
6, Lyons Range, Calcutta-1.

(b) *Printing ink manufacturers:*

*19. Coates of India Ltd.;
3, Canal East Road, Ultadingi, Maniktolla, Calcutta-4.

*20. Rainbow Ink & Varnish Mfg. Co. Ltd.;
133, Vakola, Santa Cruz, Bombay.

(c) *Rubber manufacturers:*

*21. Firestone Tyre & Rubber Co. of India Ltd.;
P.O. Box No. 197, Bombay.

*22. Travancore Rubber Works,
P.O. Box No. 15, Trivandrum.

23. Dunlop Rubber Co. (India) Ltd.;
"Dunlop House", 57-B, Free School Street, Calcutta-16.

*24. Bata Shoe Co. Ltd.;
Batanagar, 24 Parganas, Calcutta.

25. National Rubber Manufacturers Ltd.;
Leslie House, 19, Chowringhee, Calcutta-13.

*26. Association of Rubber Manufacturers in India,
57-B, Free School Street, P.O. Box No. 391, Calcutta.

*27. Indian Rubber Industries Association,
7, Homji Street, Bombay.

(d) *Paper manufacturers:*

28. Indian Paper Makers Association,
Royal Exchange, P.O. Box No. 280, Calcutta.

29. Indian Paper Mills Association,
23-B, Netaji Subhas Road, Calcutta.

(e) *Linoleum manufacturers:*

*30. Indian Linoleums Ltd.;
8, Royal Exchange Place, Calcutta-1.

CONSUMERS (Contd.)

(f) *Vitreous enamellers:*

*31. Vitreous Enamellers' Association,
60/2, Dharamtala Street, Calcutta-13.

*32. Bengal Enamel Works Ltd.,
60/2, Dharamtala Street, Calcutta-13.

*33. Sur Enamel & Stamping Works Ltd.,
24, Middle Road, Entally, Calcutta.

34. Indian Enamel Works Ltd.,
Phirozshah Mehta Road, Bombay.

(g) *Soap & Cosmetic manufacturers:*

*35. Godrej Soaps Ltd.,
316, Delisle Road, Jacob Circle P.O., Bombay-11.

*36. Lever Brothers (India) Ltd.,
Scindia House, Ballard Estate, Bombay.

(h) *Rayon & textile manufacturers:*

*37. National Rayon Corporation Ltd.,
Evart House, Bruce Street, Fort, Bombay.

@38. Travancore Rayons Ltd.,
Rayonpuram P.O., Travancore-Cochin State.

39. Silk & Art Silk Mills Association Ltd.,
Podar Chambers, Parsee Bazar Street, Fort, Bombay.

(i) *Miscellaneous:*

40. B.I. United Shoe Material Co.,
Pipal Mandi, Agra.

*41. Kores (India) Ltd.,
Plot No. 10, Off Haines Road, Worli, Bombay-18.

42. All India Plastic Manufacturers' Association,
Chowpatty Chambers, Sandhurst Bridge, Bombay.

APPENDIX III

[*Vide* paragraph 3(c)]

List of persons who attended the public inquiry on 12th June, 1953.

PRODUCERS:

1. Mr. J.R. Marshall 2. Dr. A. Bowman	Representing	Travancore Titanium Products Ltd., Kochu Veli, Trivandrum, Travancore-Cochin State.

IMPORTERS:

Mr. K.N. Bhatt	"	New Standard Chemicals Co. Ltd., 28, Samuel Street, Vadgadi, Bombay.

CONSUMERS:

1. Mr. P. Cooper 2. Mr Shegaonkar	"	Indian Paint Manufacturers Association, 23-B, Netaji Subhas Road, Calcutta-1.
3. Mr. A.L. Blackwood	"	Firestone Tyre & Rubber Co. of India Ltd.; P.O. Box No. 197, Bombay.
4. Dr. S.R. Agrawal 5. Mr. D.S. Kulkarni	"	Indian Rubber Industries Association, 7, Homji Street, Bombay.
6. Mr. E.A. Brown 7. Mr. S.V. Sathaye	"	Paint Federation, Royal Exchange, P.O. Box No. 280, Calcutta-1.
8. Mr. P.Y. Scarlett 9. Mr. J.W. Oates	"	Goodlass Wall Co. Ltd., Furgusson Road, Lower Parel, Bombay.

GOVERNMENT OFFICIALS:

1. Mr. N. Srinivasan,
   Ministry of Commerce & Industry (Development Wing),
   Government of India, New Delhi.
2. Dr. P.V. Nair,
   Director of Industries and Commerce,
   Travancore-Cochin State, Trivandrum.
3. Mr. M.C. Thomas,
   Secretary to Government, Development Department,
   Travancore-Cochin State, Trivandrum.
4. Dr. J. Gupta,
   Assistant Director, Inorganic Division,
   National Chemical Laboratory of India, Poona.

OTHERS:

1. Dr. K.L. Moudgill,
   Deputy Director (Chemicals),
   Indian Standards Institution, Delhi.
2. Brigadier F.H.B. Ingall, D.S.O., O.B.E.,
   C/o Killick Nixon & Co. Ltd., Bombay. (Observer)

APPENDIX IV

[*Vide* paragraph 11(e)]

Summary of amendments for paint formulations re-drafted by the Indian Standards Institution.

(Note:- In column 5 the letters 'R' and 'A' respectively denote the rutile type and anatase type of titanium dioxide)

Indian Specification No.	Description of paint	Original Specifications		Revised alternative specifications	
		Ingredient	Proportion	Ingredient	Proportion
1.	2.	3.	4.	5.	6.
1. IS: 86-1950	Oil paste for paints to Indian standard colours.	White lead and Zinc oxide.	Not less than 33 per cent. each.	Titanium dioxide (R)	Not less than 20 per cent.
		Barytes and Tinters.	Remainder	Zinc oxide	Not less than 25 per cent.
				Barytes or other extenders and Tinters.	Remainder.
2. IS: 95-1950	Oil paste for paints, exterior, white.	White lead	75 ± 1 per cent.	Titanium dioxide (R)	20 ± 1 per cent.
		Zinc oxide.	Remainder.	White lead	20 ± 1 per cent.
				Zinc oxide	20 ± 1 per cent.
				Barytes or other extenders.	Remainder.
3. IS: 96-1950	Oil paste for paints, interior, white.	Zinc oxide	Not less than 25 per cent.	Titanium dioxide (A or R).	Not less than 20 per cent.
		Lithopone	Not less than 50 per cent.	Zinc oxide	Not less than 20 per cent.
		Barytes	Remainder.	Barytes or other extenders.	Remainder.

1.	2.	3.	4.	5.	6.
4. IS: 111-1950	Ready mixed paint, brushing, undercoating, exterior, to Indian standard colours.	White lead	Not less than 70 per cent.	Titanium dioxide (R)	Not less than 20 psr cent.
		Extenders and Tinters.	Remainder.	White lead	Not less than 20 per cent.
				Extenders and Tinters.	Remainder.
5. IS: 113-1950	Ready mixed paint, brushing, undercoating, interior, to Indian standard colours.	Lithopone	Not less than 55 per cent.	Titanium dioxide (R)	Not less than 15 per cent.
		Extenders and Tinters.	Remainder.	Zinc oxide.	Not less than 5 per cent.
				Extenders and Tinters.	Remainder.
6. IS: 117-1950	Ready mixed paint, brushing, finishing, exterior, oil gloss, for general purposes, to Indian standard colours.	White lead	Not less than 33 per cent.	Titanium dioxide (R)	Not less than 15 per cent.
		Zinc oxide	Not less than 33 per cent.	Zinc oxide	Not less than 25 per cent.
		Argillaceous matter.	Not more than 10 per cent.	Argillaceous matter	Not more than 10 per cent.
		Whiting	Not more than 10 per cent.	Whiting	Not more than 10 per cent.
		Barytes and Tinters.	Remainder.	Barytes and Tinters	Remainder.
7. IS: 127-1950	Ready mixed paint, brushing, finishing, exterior, oil gloss, for general purposes, white.	White lead	75 ± 1 per cent.	Titanium dioxide (R)	Not less than 25 per cent.
		Zinc oxide	Remainder.	Zinc oxide	Not less than 20 per cent.
				Barytes or other extenders.	Remainder.

1.	2.	3.	4.	5.	6.
8. IS: 129-1950	Ready mixed paint, brushing, finishing, interior, oil gloss, for general purposes, to Indian standard colours.	Zinc oxide	Not less than 50 per cent.	Titanium dioxide (R)	Not less than 15 per cent.
		Argillaceous matter.	Not more than 10 per cent.	Zinc oxide	Not less than 10 per cent.
		Whiting.	Not more than 10 per cent.	Argillaceous matter	Not more than 10 per cent.
				Whiting	Not more than 10 per cent.
		Barytes and Tinters.	Remainder.	Barytes and Tinters	Remainder.
9. IS: 132-1950	Ready mixed paint, spraying, exterior, oil gloss, for general purposes to Indian standard colours.	Zinc oxide	75 per cent.	Titanium dioxide (R)	Not less than 15 per cent.
		Argillaceous matter.	Not more than 10 per cent.	Zinc oxide	Not less than 20 per cent.
		Whiting.	Not more than 10 per cent.	Argillaceous matter.	Not more than 10 per cent.
				Whiting	Not more than 10 per cent.
		Barytes and Tinters.	Remainder.	Barytes and Tinters.	Remainder.
10. IS: 167-1950	Ready mixed paint, thick white, for lettering.	White lead	75 ± 1 per cent.	Titanium dioxide (R)	Not less than 20 per cent.
		Zinc oxide	Remainder.	White lead	Not less than 20 per cent.
				Zinc oxide	Not less than 20 per cent.
				Barytes or other extenders.	Remainder.

APPENDIX V

[*Vide* paragraph 14]

IMPORT CONTROL POLICY

(I) *Titanium dioxide and Lithopone:*

January-June, 1951: Licences were issued to the extent of 20 per cent of half of their best year's imports for established importers and to their half yearly requirements for actual users.

July-December, 1951: Both titanium dioxide and lithopone were under Open General Licence. In the case of titanium dioxide licences were issued only from soft currency countries while in the case of lithopone licences were issued from all sources.

January-June, 1952: Both titanium dioxide and lithopone were covered by O.G.L. XXIII.

July-December, 1952: Applications for licences were considered only from actual users the quota being to the extent of their half yearly requirements.

January-June, 1953: (a) *Titanium dioxide* - No licences will be issued to established importers. Applications will be considered only from actual users on an *ad hoc* basis.

(b) *Lithopone* - No licences will be issued to established importers and new comers. Licences will be granted only to actual users on an *ad hoc* basis. In considering their applications for licences the following points will be taken into account:-

(i) The stocks in hand.

(ii) Whether the actual user is utilising titanium dioxide available from indigenous sources. If titanium dioxide is not being utilised, full reasons justifying the application for import of lithopone should be clearly stated.

July-December, 1953: No quota licences will be issued to established importers. For actual users, applications will be considered *ad hoc*.

(II) *Zinc oxide and white lead:*

January-June, 1951 & July-December, 1951: No licences were issued.

January-June, 1952: Licences were issued to actual users.

July-December, 1952 and January-June, 1953: No licences were issued.

July-December, 1953: Zinc oxide - No licences will be issued.

APPENDIX VI

[*Vide* paragraph 18]

Statement showing the c.i.f., prices, customs duties, clearing charges and landed costs of imported titanium dioxide.

(All figures per cwt.)

Sl. No.	Source of information	Origin of import	Date of import	Type and specification	C.i.f. price per cwt.	Customs duty	Clearing charges	Landed cost	Remarks
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
					Rs.As.Ps.	Rs.As.Ps.	Rs.As.Ps.	Rs.As.Ps.	
				(a) Anatase type					
1.	Imperial Chemical Industries (India) Ltd., Calcutta.		May 1951	Anatase type	63-12- 6			110- 0- 0	They have not furnished information regarding the origin of import, but it is presumed that it should be from the U.K. They have not furnished information regarding the customs duty and clearing charges.
			Oct. 1951	-do-	104-10-11			136-14- 5	
			Jan. 1952	-do-	105-11- 6			138- 0- 7	
2.	Collector of Customs, Bombay.	U.K.	24-12-1951	-do-	111- 0- 1	28- 1-10 (25-1/5%)	0- 9- 1	140- 4- 0	
3.	Collector of Customs, Cochin.	U.K.	7- 5-1951	-do-	83- 3-11	22-11- 7 (27-3/10%)	0-12- 0	106-11- 6	
				(b) Rutile type					
1.	Imperial Chemical Industries (India) Ltd., Calcutta.		May 1951	Rutile type	95- 4- 1			125- 7- 8	They have not furnished information regarding the origin of import, but it is presumed that it should be from the U.K. They have not furnished information regarding the customs duty and clearing charges.
			Oct. 1951	-do-	116- 3- 6			152- 5- 2	
			Aug. 1952	-do-	119-12-11			157- 2- 4	
2.	Addison & Paints & Chemicals Ltd., Madras.		1951	-do-	168- 4- 0			228- 1- 4	This was the maximum price in 1951.
			-do-	-do-	110- 4- 0				This was the minimum price in 1951.
			1952	-do-	186- 1- 4			230- 6- 8	This was the maximum price in 1952.
			-do-	-do-	149-14- 6			197- 2- 8	This was the minimum price in 1952.
3.	Collector of Customs, Bombay.	U.K.	7- 4-1953	Rutile 272 grade.	102- 1- 6	25-13- 8 (25-1/5%)	0- 0- 9	127-14- 0	